



JOURNAL
OF THE
NEW YORK
ENTOMOLOGICAL SOCIETY

Devoted to Entomology in General

Volume XVIII, 1910

EDITED BY WILLIAM MORTON WHEELER

NEW YORK
PUBLISHED BY THE SOCIETY
QUARTERLY
1910

224144

PRESS OF
THE NEW ERA PRINTING COMPANY
LANCASTER, PA



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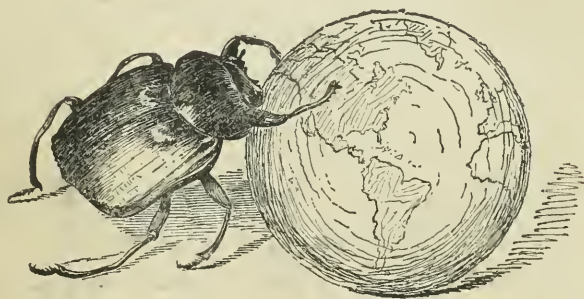
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MARCH, 1910.

Edited by WILLIAM MORTON WHEELER.

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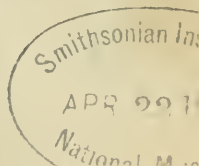
Published Quarterly by the Society.

LANCASTER, PA.

NEW YORK CITY.

1910.

[Entered April 21, 1904, at Lancaster, Pa., as second-class matter, under Act of Congress of July 16, 1894.]



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JOURNAL

OF THE

New York Entomological Society.

Published quarterly by the Society at 41 North Queen St., Lancaster Pa., and New York City. All communications relating to the JOURNAL should be sent to the editor, W. M. Wheeler, Bussey Institution, Forest Hills, Boston, Mass. all subscriptions to the Treasurer, Wm. T. Davis, 46 Stuyvesant Place, New Brighton, Staten Is., New York, and all books and pamphlets to the Librarian, C. Schaeffer, Museum, Eastern Parkway, Brooklyn, N. Y. Terms for subscription, \$2.00 per year, strictly in advance. *Please make all checks, money-orders, or drafts payable to NEW YORK ENTOMOLOGICAL SOCIETY.*

Authors of each contribution to the JOURNAL shall be entitled to 25 separates of such contribution without change of form. If a larger number be desired they will be supplied at cost provided notice is sent to the Editor before the page proof has been corrected.

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VOL. XVIII.

MARCH, 1910.

No. 1.

SOME NOTES ON THE GEOLOGICAL HISTORY OF THE PARASITIC HYMENOPTERA.*

BY CHARLES T. BRUES.

BOSTON, MASS.

PART I. GENERAL CONSIDERATIONS.

The occurrence in considerable abundance of fossil parasitic Hymenoptera in the deposits of the early and middle Tertiary has long been known, but it is only quite recently that they have received close attention. As early as 1849, in his classical work on the fossil insects of the Radoboj (Lower Miocene) and Oeningen (Upper Miocene) deposits, Heer ('47) described a considerable number of species belonging to these families, but this was before the classification of recent forms had been well worked out, and on this account his results are unsatisfactory from a more modern standpoint. The very rich fauna of Baltic amber (Lower Oligocene) was the subject of a brief note by Brischke ('86) where the occurrence of a number of recent genera in amber was recorded. I have lately had the opportunity to examine a small collection from the same source and have been able to detect a considerable series additional to those seen by Brischke. In America there is a very rich fauna of parasitic Hymenoptera preserved in the Miocene shales of an old Tertiary lake

* Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 14.

basin near Florissant, Colorado, and from these many genera have been taken which have been lately described (Cockerell, '06, and Brues '06, '10). These two sources taken together have already afforded such a considerable number of types that it is now possible to draw from the accumulated data some general conclusions regarding the phylogeny and geological history of certain components of this most interesting series of insects. Although necessarily quite incomplete and of a tentative nature, these have a bearing on the relationship of recent faunæ and are of both theoretical and practical interest, more particularly in view of the recent great advances made in the utilization of parasitic insects in combating injurious species.

The following list, compiled both from the literature and from unpublished observations, includes all the accurate determinations of genera relating to the parasitic Hymenoptera of Baltic amber and of the Miocene shales of Florissant. To facilitate a comparison of the two faunæ, they have been placed in parallel columns, with the corresponding families in juxtaposition.

GENERA OCCURRING IN BALTIC AMBER AND AT FLORISSANT.*

Baltic Amber.

Florissant Shales.

BETHYLIDÆ.

Sicrola.

Epyris.

Parasicrola.

Epyris.

Bethylinæ gen. nov.

Dryinus.

Chelogynus.

Dryininæ gen. nov.

PROCTOTRYPIDÆ.

Proctotrypes.

Proctotrypes.

BELYTIDÆ.

Several genera.

Pantocilis.

Belyta.

DIAPRIIDÆ.

One genus.

‡*Galesimorpha*.

* Names preceded by an asterisk (*) have been previously found by other observers, those preceded by a dagger (†) have not been seen fossil by the writer and those preceded by a double dagger (‡) are those of extinct genera.

CERAPHRONIDÆ.

**Ceraphron*.

SCELIONIDÆ.

**Hadronotus*.

CYNIPOIDEA.

†*Cynips*.*Figites*.†*Diastrophus*.*Andricus*.

Several genera.

‡*Protoibalia*.

AGAONIDÆ.

Tetrapus.

TORYMIDÆ.

Monodontomerus.*Torymus*.‡*Palæotorymus*.*Ormyrodes*.**Chalcis*.*Spilochalcis*.

EURYTOMIDÆ.

†*Dccatoma*.*Eurytoma*.

PERILAMPIDÆ.

†*Perilampus*.

CLEONYMIDÆ.

Cleonymus.

PTEROMALIDÆ.

†*Pteromalus*.*Pteromalus*.

One genus.

MYMARIDÆ.

†*Eustochus*.†*Anaphes*.†*Gonatocerus*.†*Limacis*.†*Litus*.†*Malfattia*.†*Palæomymar*.

EVANIIDÆ.

†*Evania*.*Aulacus*.†*Brachygaster*.*Pristaulacus*.*Oleisopriester*.*Aulacus*.

ICHNEUMONIDÆ.

ICHNEUMONINÆ.

Ichneumon*.*Trogus*.Ichneumon*.

CRYPTINÆ.

†*Phygadeuon*.*Phygadeuon*.†*Hemiteles*.*Hemiteles*.†*Pezomachus*.*Cryptus*.**Cryptus*.*Mesostenus*.

Several other genera.

PIMPLINÆ.

Lampronota.*Acænites*.†*Pimpla*.*Leptobatopsis*.*Lampronota*.*Glypta*.*Polysphincta*.*Pimpla*.*Xylonomus*.

TRYPHONINÆ.

Mesoleptus*.*Mesoleptus*.Tryphon*.*Tryphon*.†*Bassus*.*Orthocentrus*.*Camerotops*.*Exochus*.*Tylecomnus*.

OPHIONINÆ.

Astiphronma.‡*Protohellwigia*.†*Mesochorus*.*Labrorychus*.**Porizon*.*Anomalon*.*Barylypa*.*Exochilum*.‡*Hiatensor*.*Limnerium*.*Absyrtus*.*Parabates*.? *Ophcltes*.*Lapton*.*Extastes*.*Mesochorus*.

		<i>Porizon.</i>
		<i>Dcmophorus.</i>
	ALYSIIDÆ.	
		<i>Alysia.</i>
	BRACONIDÆ.	
	EUPHORINÆ.	
		<i>Euphorus.</i>
	METEORINÆ.	
<i>*Mcteorus.</i>		
	MACROCENTRINÆ.	
† <i>Macrocentrus.</i>		
<i>Microtypus.</i>		
	HELCONINÆ.	
		<i>Diospilus.</i>
		<i>Dyscolctes.</i>
	BLACINÆ.	
<i>Blacus.</i>		
<i>Brachistes.</i>		
	SIGALPHINÆ.	
		<i>Calyptus.</i>
		<i>Urosigalphus.</i>
	CHELONINÆ.	
<i>*Ascogaster.</i>		
<i>*Chelonus.</i>		<i>Chclonus.</i>
	AGATHIDINÆ.	
		AGATHIS.
	MICROGASTERINÆ.	
		<i>Microgaster.</i>
		<i>Microplitis.</i>
		<i>Oligoneuroides.</i>
	OPIINÆ.	
<i>Diachasma.</i>		
	BRACONINÆ.	
† <i>Bracon.</i>		
	RHOGADINÆ.	
<i>Ischiogonus.</i>		
		<i>Exothecus.</i>
		<i>Rhogas.</i>
	STEPHANIDÆ.	
		† <i>Protostephanus.</i>

A casual examination of this tabular arrangement reveals the fact that about an equal number of genera are so far known from Baltic amber and from Florissant. This total is, however, a very poor means of comparison, for the greatest diversity exists in the representation of the individual families and groups. This is in part readily accounted for by the different way in which the insects have been entrapped previous to fossilization. As is well known, only such species occur in amber as have come in contact with the trunks of the trees bearing the sticky resin destined to become fossilized as amber. This at once exercised a selection with regard to certain groups which normally frequent such places and would appear to account for the presence of so many genera belonging to the Bethyridæ. Some such forms live in galls, others are parasitic on wood-boring beetles, still others on leaf-hoppers, etc., which would have brought them in proximity to the resin upon the trees. Other forms like Mymaridæ are so delicate and fragile that we can scarcely hope ever to find their remains in petrified form, although the beautiful preservation afforded by amber has made it possible to identify many species imbedded in this medium. This family so abundant in amber is, therefore, entirely absent in the Florissant shales. Aside from the poorer preservation of the Florissant material, the different way in which it has been laid down has resulted in the selection of quite a different component of the then existing fauna from that which appears in amber. The types occurring at Florissant are almost exclusively actively flying forms or others which live in proximity to bodies of water, since these deposits contain the remains of insects which had either flown into the waters of the original Florissant lake or one of its tributaries, or had possibly been engulfed in volcanic ash with which they were transported thither by streams. In some groups of Hymenoptera like the ants (Wheeler, '08) this has resulted in mutually excluding from the amber and florissant beds in great part that which occurs in the other. Thus, chiefly the workers of arboreal species occur in amber, while with few exceptions only winged forms are found in the Florissant deposits.

With the parasitic Hymenoptera, this is, however, not generally the case in families like the Ichneumonidæ, Braconidæ, Evaniidæ and the Proctotrypoidea, as is shown by the contents of the foregoing

table, and these groups can be quite satisfactorily compared, both with each other and with recent faunæ. In such a comparison, the most striking fact which attracts one's attention is the predominance of recent genera both in amber and at Florissant. Wheeler ('08) has summarized the ratio of living to extinct genera of ants known from Baltic amber and finds it to be in the proportion of 24 living to 11 extinct genera among a total of 35. The ratio of living to extinct genera of parasitic Hymenoptera in this amber has not yet been thus accurately determined, but there can be no doubt that it is much larger in favor of the recent ones. The same preponderance of modern genera is characteristic of the Florissant shales which have been more extensively studied, for here there are 63 living compared to 6 extinct genera among the parasitic families. The only conclusion to be reached from these data is that such types must be more conservative than the ants in the development of new generic types in spite of the complicated relations which they bear to their hosts. The very recent discoveries of so many most extraordinary and unexpected adaptations in the development and ethological relations of parasitic groups makes this still more remarkable for we should naturally look for correlations between such an enormous ethological plasticity and the morphological characters associated with it. It would appear that the logical conclusion to be drawn from such facts is that the adaptations in habits known to exist in recent species must be well fixed and were also present at least in a very similar form in Oligocene and Miocene species, which suggests that all attempts to trace the phylogeny of the larger groups must be pushed far into pre-Tertiary time. This same conclusion has been reached by other students of fossil insects of the more specialized orders and it seems well nigh hopeless in the present state of knowledge to attempt any generalizations concerning the phylogeny of the larger groups of Hymenoptera from paleontological data alone. Facts bearing on the occurrence and relationships of pre-Tertiary Hymenoptera are extremely meager, although the living families and genera appear suddenly in early Tertiary (Oligocene) times in nearly the same proportion as they do at present.

The most recent attempt to trace the origin of the parasitic Hymenoptera is that of Handlirsch ('08) who falls back mainly on pale-

ontology for the support of his conclusions. He would derive the group as follows: "The first forms with an elongated ovipositor may have come from Pseudosiricidæ which no longer laid their eggs in wood, but in the eggs of beetles occurring in the wood (Buprestidæ already existed). Thus the first parasitic Hymenoptera may have arisen, to which the Ephialtitidæ, still so poorly known, may belong." From these parasitic forms he would then derive the aculeates, digger wasps and bees. He considers further that the Ichneumonidæ are the most primitive of the various parasitic families, and that among these the Pimplinæ are the least specialized. The Braconidæ, Chalcidoidea, Proctotrypoidea, Evaniidæ and Stephanidæ he believes to be highly specialized forms.

As Handlirsch himself seems to appreciate, there are many difficulties in the way of this interpretation, and I believe that it will have to be fundamentally altered. In the first place the derivation of the Tertiary forms from *Ephialtites*-like insects rests upon a very slender basis. The problematic genus *Ephialtites*, resembling a Braconid or Torymid is the only member of the higher Hymenoptera as yet to be found in the Jurassic (Malm), and its perhaps accidental discovery there in nowise involves the probability of its being a primitive type; indeed the wonderful development of the parasitic Hymenoptera in the early Tertiary where they so closely simulated recent forms would lead us to believe that *Ephialtites* must be only one of many earlier types occurring contemporaneously, but remaining still unearthed by paleontologists.

The common occurrence of Jurassic Siricoid forms is however well authenticated and in combination with the primitive morphological characters of the recent Siricidæ and allied families gives good ground for considering them allied to the ancestors of the higher Hymenoptera.

Among the families of parasitic Hymenoptera I am inclined to believe for several reasons that certain of the Evaniidæ are the most generalized and that they represent the most primitive group of parasitica still surviving. Although they occur with other families in both amber and at Florissant, it seems quite certain that they were more abundant then than at the present time. Thus from the Florissant shales I have described two species of Aulacinæ probably representing two different genera, and there occur in Baltic amber

at least four genera belonging both to the Aulacinæ and Evaniinæ. This proportion is much greater than would occur in a general collection of recent insects, so we may safely infer that the Evaniidæ were more abundant in Tertiary times than at the present day. From a morphological standpoint this family also appears to be more closely allied to the phytophagous hymenoptera in several respects. In the first place the costal cell of the front wing is preserved while it is absent in the Ichneumonidæ and Braconidæ, although present also in many other families. In the Aulacinæ at least the wings have a more complete and primitive venation than in the Ichneumonidæ, and than in most of the Braconidæ as well. The absence of the costal cell in the Ichneumonidæ would thus appear to exclude them at once from the line of descent of aculeate forms.

Of the Braconidæ and Ichneumonidæ, the former are much more nearly related to the Evaniidæ through forms like *Cænocelius* (*Aulacodes*) which has been variously placed by different writers in both families although it has been even considered by Cresson ('65) as more closely related to the Ichneumonidæ. On the other hand the small and peculiar family Stephanidæ bridges the gap between certain other Evaniidæ (Fœninæ) (Bradley, '08) and one of the groups of true Braconidæ (Spathiinæ). The Stephanidæ are further peculiar in having a horned structure of the head, recalling that of certain Oryssidæ, as has already been pointed out by Ashmead ('00), a character which gives additional evidence of their primitive character. Only a single Stephanid of dubious relationship, *Protostephanus*, has been found fossil, at Florissant (Cockerell, '06). This group of three families is therefore very evidently to be regarded as a natural association. The Ichneumonidæ however present more difficulties and I cannot subscribe to Handlirsch's opinion that they are more primitive than any of the families heretofore mentioned. Their wings, which are very constant in venation, always lack the costal vein present in the Evaniidæ and Stephanidæ, while the basal section of the cubital vein is invariably absent though normally present in other families. On the other hand they cannot be derived from the Braconidæ as known from any Tertiary genus on account of the presence of the second recurrent nervure, which is invariably absent in the Braconidæ. In other respects the two families are very similar and both must, I think, be derived from as yet unknown forms possessing common

characters of two recurrent nervures and a complete cubital vein. Such a type is represented by the genus *Lysiognatha* Ashmead ('95) but this form has the peculiar exodont mandibles of the Alysiidæ which on this account cannot be considered a part of the stem from which the Braconidæ and Ichneumonidæ have been derived, although I believe they represent an offshoot not far from it. In the Miocene at Florissant Alysiidæ occur apparently in about the same proportion as they do in recent times. There is one other remarkable type with exodont mandibles, *Vanhornia*, recently described by Crawford ('09), but its affinities are so problematic that it can hardly enter into the present discussion. So far the family Agriotypidæ has not been found fossil, and any conclusions regarding its relationships must be derived from taxonomic studies alone.

Several families of the Proctotrypoidea have been discovered fossil, the Proctotrypodæ, Belytidæ, Diapriidæ, Ceraphronidæ and Scelionidæ, but with one exception all the genera are apparently identical with recent ones and none give any clue to the probable origin of the group.

The same is true of the Cynipoidea, with the exception of one genus *Protoibalia* (Brues, '10) from the Miocene shales of Florissant which shows characters transitional from the genuine Cynipids to the Ibalinæ.

Although the paleontological evidence concerning the origin of the foregoing families is scant it leads to a few general conclusions and they agree well with those derived from anatomical studies of the same families.

There is another family, the Bethylidæ, well represented in amber by some genera, which, taken in connection with a number of recent ones, indicate very nicely part of the line of evolution within this group.

It is a generally accepted fact that the older and more stable groups of animals, particularly those which are decadent from a paleontological standpoint, are the least adaptive, while those at present on the ascendent are better fitted to survive and prosper under changed conditions of environment.

The importance of this principle to the economic entomologist is at once apparent in connection with all attempts to introduce and naturalize parasitic insects with a view toward checking the increase

of injurious species, and its application to various parasitic types is of value in presaging the feasibility of introducing certain types. With reference to the insects under consideration the Evaniidæ and Stephanidæ appear as the most unlikely forms to adapt themselves to a changed environment, and of the two much larger related families, the Braconidæ and Ichneumonidæ, the former is for at least one reason the less promising. As I have pointed out in a previous paper ('10), it gives evidence of having been more abundant in the past, thus representing a somewhat decadent type. Among the several divisions of the Ichneumonidæ, the Pimplinæ appear to be decreasing in abundance although there is no doubt that some recent species are very plastic to judge from their adaptation to a large series of quite different host species. The Ophioninæ were very abundant in the Miocene and have materially decreased in number since that time, while the Ichneumoninæ, Cryptinæ and Tryphoninæ show no decrease. Prototrypoidea are not on the ascendent, but Chalcidoidea and Cynipoidea appear to be very markedly so, and the increasing abundance of the chalcidoids, in connection with their ability for rapid increase, suggests them as eminently suitable for experimental introduction.

Another factor entering into the practical use of parasitic species is the general character of the present faunæ of the various geographical regions, and a mention of the slight paleontological evidence bearing on this matter may not be amiss. It must, however, be borne in mind that a more complete knowledge of fossil insects might easily reverse conclusions drawn from such necessarily fragmentary data. The presence of Indo-Australian types in Baltic amber of Oligocene age has been recently noted by Wheeler ('08) among ants, and I have recognized the same tendency among parasitic Hymenoptera, so that at least some of the present types of this region show a primitive or synthetic character and we should not expect to find them adaptive. This is of course merely a repetition of conditions long known to exist in the vertebrate fauna of this region. Besides this rather positive evidence entomology can at present offer nothing in this line additional to what has been discovered from the investigation of the higher groups of animals.

PART II. THE PALEONTOLOGICAL DEVELOPMENT OF THE BETHYLIDÆ.

The family Bethylidæ was first segregated and defined by Haliday ('39) who considered it as forming a part of the fossorial Hymenoptera. It was, however, later removed by Westwood ('40) from this position and assigned to a place among the Proctotrypidæ of which he believed it to represent a subfamily of equivalent rank to the Ceraphroninæ, Scelioninæ, etc., which are now generally regarded as distinct families of the Proctotrypoid series. In his earlier writings Ashmead following Westwood included it as the subfamily Bethylinæ in his Monograph of the North American Proctotrypidæ ('93). He later, however, recognized its fossorial affinities and removed it to his superfamily Vespoidea where it stands as a distinct family in his classification of this group published in the Canadian Entomologist for 1902. In this paper he gives the following condensed account of his position in regard to the group: "I am now convinced that Haliday was right that these insects are allied to the fossorial wasps, and have nothing to do with genuine Prototrypoids; they are clearly allied to the Chrysididæ, through the Cleptinæ and Amesiginæ, and to the Sapygidæ, Tiphidæ, Cosilidæ, Thynnidæ, Myrmosidæ and Mutillidæ, all parasitic families." It is thus clear that he considered their affinities quite varied, including so many families as allied with them. It is quite evident that his mention of the Chrysididæ refers to the genus *Pristocera* and its allies which show unmistakable resemblances to that family, while the Sapygid and Tiphid affinities were no doubt based on *Epyris* and its allies, and those with the Thynnidæ and Myrmosidæ probably on *Dryinus*, *Pedinomma*, etc.

Since that time, one group regarded by Ashmead as a subfamily has been separated from the Bethylidæ, by Perkins ('05) and Kieffer ('07) as the Dryinidæ, but otherwise the group has remained intact.

For some reason, possibly on account of their small size and not very abundant occurrence in collections, these insects have not received much attention in recent years until very lately, with the exception of Ashmead's previously cited work ('93). With the discovery that some species of *Gonatopus* and related forms are important parasites of the leaf-hoppers injurious to sugar cane, this part of the group has quite lately attracted more attention and a considerable number of species have been described by Perkins ('05) as well as by Kieffer, and several others. A considerable series

of new and aberrant genera have also been discovered which are referred to the family, so that during the past five or ten years our knowledge of the group has been greatly increased.

During this time it has become apparent that the group is of very heterogeneous composition and that it must include several series of forms which have been derived from different sources. Unfortunately a number of the genera are at present known only by their wingless or subapterous females which increases the difficulty of determining their affinities, since the wing venation is perhaps the most important single character so far discovered in defining the limits of many of the groups of Hymenoptera. Even in forms with wings, the neuration of these organs is much reduced or atrophied so that the primitive types from which they must have been derived are difficult of determination. With these important characters lacking, many forms exhibiting reduced neuration or atrophied wings have been included in the family on account of their similar appearance notwithstanding the possibility or even likelihood that such a condition is the result of convergence rather than an indication of real genetic relationship. On this account I have been led to attempt a study of the characters of some of the members of the family previously known, and, at the same time to present some conclusions derived from several genera, both recent and fossil which are here discussed for the first time.

The Bethylinæ are characterized by the elongate, flattened form of the head, 12-13-jointed antennæ, more or less elongate prothorax

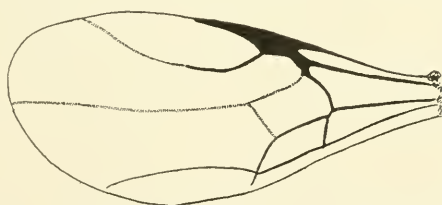


FIG. 1. *Palæobethylus longicollis* Brues MS.; wing.

and usually thickened legs. The wingless females in most cases have the thorax much constricted between the meso- and metathoracic segments. This group appears to be more closely related to the Ampulicidæ than to any other family of the fossoræ and this relationship is very strongly shown by a peculiar genus which I have

lately discovered fossil in Baltic amber. In the fossil genus, which is unmistakably a Bethyloid, the prothorax is unusually long, like that of the Ampulicid *Rhinopsis*, and also bears a strong median longitudinal sulcus similar to that of *Rhinopsis*. The wing venation is considerably reduced (Fig. 1), but less so than in any living genus of the Bethylinæ and can be readily derived from the type of *Rhinopsis* by the suppression of the transverse cubital veins and the loss of the second recurrent nervure. The head has the same lenticular form and bears 13-jointed antennæ. The form of the mesothorax is very similar; it bears a second pair of lateral parapsidal furrows, and the size, form and sculpture of the metathorax is almost identical. The most striking difference is the absence of the well-developed abdominal petiole of *Rhinopsis* and the thickening of the legs, both Bethyline characters. From a close study of these two genera I feel convinced that the Bethylinæ, typified by *Epyris* and its allies have been derived from Ampulicidæ quite similar to *Rhinopsis*, and this opinion is further supported by the fact that the Ampulicidæ appear to be an old and archaic group.

Another part of the family, represented most typically by the genus *Pristocera* is, I think, also derived from an Ampulicid-like form, for it also shows unmistakable similarities to *Rhinopsis*. In the winged forms (males) of this group the loss of wing veins has proceeded a little farther than in the fossil genus above referred to; the legs have been less modified, remaining slender, and the thorax, except the prothoracic segment, is scarcely different from that of *Rhinopsis*. The prothorax has been much shortened, and the head, instead of becoming more elongate, is thickened and quadrate in form. The abdomen is less modified, being subpetiolate.

Probably the most easily defined and sharply circumscribed group of the Bethyloid series is the group variously regarded as a family or subfamily, represented by *Dryinus* and its allies. The fore tarsi of the females of this group are peculiarly modified into a chelate structure involving the terminal joint. This modification, which occurs in nearly all the genera, is so extraordinary and characteristic that it serves for their instant recognition. The form of the head and thorax of the members of this group is also very different from that of other Bethyloids although the wings and abdomen are quite similar. The legs in all genera have the coxæ and trochanters very elongate

and the femora strongly obclavately thickened. The chelate tarsi and the uniformly 10-jointed antennæ occur also in a number of fossil species belonging to several genera found in Baltic amber of Oligocene age, but in a new genus from Borneo, here described for the first time, the tarsi are simple as in two other known genera, and the antennæ are 12-jointed. While there can be no doubt that it is closely related to the Dryinidæ, it approaches in many respects certain Thynnids like *Methoca*, but I think this resemblance undoubtedly superficial and that the Dryinids have also been derived from an Ampulicid type.

Another interesting series forms the subfamily Emboleminæ of Ashmead which he places between the Bethylinæ and Dryininæ ('02). Of this group the rare genus *Ampulicimorpha* Ashm. from western North America appears to be the most generalized form yet discovered (Fig. 2). As its name suggests it bears a striking resemb-



FIG. 2. *Ampulicimorpha confusa* Ashm.; wing.

lance to the Ampulicidæ also. In spite of this, however, it really shows less similarity to this family than the types previously discussed. The antennæ are 13-jointed, inserted high up on the front, and the form of the metathorax is very much like that of *Proctotrypes* and its allies. This has already been mentioned by Perkins ('05) who writes: "To me the Dryinidæ together with the small and little known subfamily Emboleminæ of Ashmead (which may probably be merged in one or the other of these) [Dryinidæ or Bethylinæ] constitute a natural group, synthetic between the old Fossorial series of the Aculeata and the true Proctotrypidæ." From a study of *Ampulicimorpha* I have been led to the same conclusion with respect to the relationship of *Ampulicimorpha* and the Proctotrypidæ, but as can be seen from the preceding discussion, not in regard to the Bethylinæ in general. With the exception of the wings, which have a very much degenerated venation in the Proctotrypidæ, the resemblance is very strong, even to the armature of the male genitalia by a pair of spines in both, and I regard *Ampulicimorpha* as a remnant of a group

from which the Proctotrypidæ have evolved, and thus well removed from the Bethylidæ.

There is still another group which forms a discordant element in the Bethylidæ, the tribe Sclerogibbini, widely distributed but represented so far as known by only a few rare genera. Of one of these, *Mystrocnemis* Kieffer, I have had the opportunity to study a species from Cape Colony recently described (Brues, '06). The group is characterized by extraordinary multiarticulate antennæ, greatly thickened legs, and in some genera by a very peculiarly formed head. The antennæ must undoubtedly be secondarily modified, for no other family except the Trigonalidæ resembling these insects in any way possesses antennæ of this sort, and the same must apply to the head. I suspect that the genus *Algoa* (Fig. 4) here described is related to this group, and as it furthermore shows strong Tiphiiid and Cosilid affinities, I believe that *Mystrocnemis* and its allies are derivatives of the group from which the recent Tiphiiidæ and Cosilidæ have come. The confirmation of this must, however, await further discoveries.

From the foregoing, it appears that the old family Bethylidæ must be regarded as a very unnatural assemblage, and in the appended table I have attempted to suggest a more acceptable arrangement of its components.

BETHYLIDÆ (including the Bethylini of Ashmead, derived from Ampulicid-like forms).

Bethylinæ.

Pristocerinæ.

DRYINIDÆ (including *Dryinus* and its allies, derived from Ampulicid-like forms).

EMBOLEMIDÆ (an ancient group related to the forms from which the Proctotrypidæ are descended).

?SCLEROGIBBIDÆ (a group related to the Tiphiiidæ and Cosilidæ).

PART. III. DESCRIPTION OF NEW GENERA AND SPECIES.

DRYINOPSIS, new genus.

Female.—Wingless. Thorax trilobed, the pro-, meso- and metathoracic segments being sharply separated. Head large, twice as wide as the thorax, much narrowed behind the eyes, and about twice as wide as thick; posteriorly sharply margined. Vertex convex, front concave above the antennæ, and below

on each side with a deep depression for the reception of each scape. Eyes large, pubescent; ocelli large and close together. Mandibles large, bidentate. Antennæ 12-jointed, stout, only about twice as long as the head-height; scape stout, as long as the two following joints together; pedicel one half as long as the first flagellar joint; following, except the last, becoming shorter and thicker, the seventh and eighth about quadrate. Maxillary palpi 5-jointed, long and slender; labials 3-jointed. Pronotum narrowed both behind and in front, just before the anterior margin with a transverse groove or constriction. Mesothorax cylindrical, stalk-like in front. Metathorax widened and globose behind. Abdomen with a short, but distinct petiole. Legs as usual, the femora slightly thickened. Anterior tarsi simple, not chelate.

***Dryinopsis simplicipes*, new species.** (Fig. 3.)

Female.—Length 5 mm. Entirely shining black, covered with sparse, long, glistening white hairs; only the first two joints of the antennæ, the palpi, the tips of the trochanters, tarsi, and apex of abdomen reddish or ferruginous. Head polished, smooth on the vertex, sparsely punctate behind the eyes; cheeks smooth. Front with an impressed line descending from the anterior ocellus, which passes over into a carinate elevation above the base of the antennæ, separating the antennal fovea. Antennæ inserted far down on the face, on a level with the base of the mandibles. Clypeus small, convex. Pronotum smooth, except for the crenulate furrow in front and a shagreened sculpture anterior to this. Mesothorax closely longitudinally striate or fluted anteriorly on the stalked portion. Metathorax entirely smooth, a little longer than the mesothorax. Petiole one third longer than wide at the apex. Second and

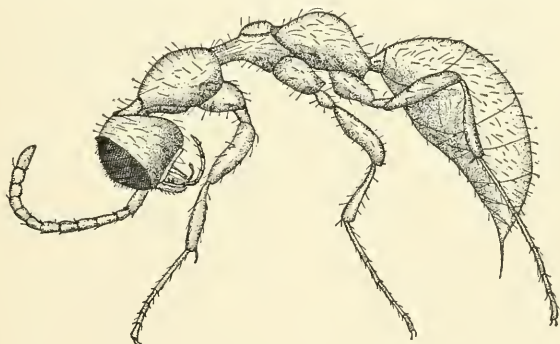


FIG. 3. *Drynopsis simplicipes*, new species; female.

third segments of nearly equal length, following growing shorter. Front tarsi simple, the first joint nearly as long as the following together. All femora obclavate; tarsal claws each with a single tooth.

Described from a specimen collected by E. B. Keeshaw at Samut Api on the west coast of British North Borneo.

This is a typical Dryinid, much resembling *Gonatopus*, but differing from this genus and its allies by the simple fore tarsi of the female. From other Dryinidæ it differs by the 12-jointed antennæ.

ALGOA, new genus.

Female.—Entirely apterous, elongate, thorax constricted medially. Head seen from above one half wider than thick antero-posteriorly but thin above, the front sloping back sharply above the antennæ which are inserted close together in lateral depressions just above the clypeus; 12-jointed, simple, short, thinner apically. Eyes bare, small, very elongate, over twice as long as broad, separated by their width from the vertex and from the base of the mandibles. Mandibles long, acute, widely separated at the base, with three microscopic teeth on the inner side at the tip. Maxillary palpi 6-jointed; first joint very short, third with a spine at its tip. Labial palpi 4-jointed. Cheeks and temples margined behind, the head concave posteriorly inside the margin. Thorax narrowed medially, widened out both in front and behind, prothorax as long as the mesonotum and metanotum together. Mesonotum very short, medially elevated, with two foveate, indistinct furrows. Metanotum wider behind, arcuately excised, with the hind angles produced and the posterior surface concave. Abdomen as long as the thorax, with six segments of which the second is the longest, distinctly constricted at the base of the second segment both above and below. Legs stout, smooth, the anterior femora especially large and swollen.

Algoa heterodoxa, new species. (Fig. 4.)

Female.—Length 2.5–5.2 mm. Piceous, the basal three joints of the antennæ, the mandibles and the legs, except the base of the coxæ and all the femora much lighter, yellowish-brown. Head highly polished, not punctate, ocelli visible in certain lights as faint dots arranged in a large triangle. Scape of antennæ as long as the first flagellar joint; pedicel two thirds as long; second flagellar joint three fourths as long, following of about equal length, but growing thinner. Thorax brownish pubescent except on the pro- and mesopleuræ, not sculptured, metanotum behind with a marginal carina. Abdomen brownish pubescent, sessile; first segment with its declivous basal portion separated by a carina; second segment as long as wide, more than twice as long as the first and equal to the following three taken together; third to fifth gradually shorter. Tibial spurs 1, 2, 2. Hind legs moderately stout, the tibiæ smooth; middle legs with the femora swollen; those of the anterior legs enormously enlarged, obovate. Fore tarsi one half longer than their tibiæ; those of the other legs nearly twice as long.

Described from four specimens collected by Dr. Hans Brauns at Algoa Bay, Cape Colony, during December and April.

This remarkable species is of doubtful relationship but has strong affinities with the *Sclerogibbini*, for the thorax, abdomen and legs

are very similar to those of *Mystrocnemis*. On the other hand it shows many resemblances to certain Pompilidæ of the group Homonotini, but differs in having a very strong ventral constriction between

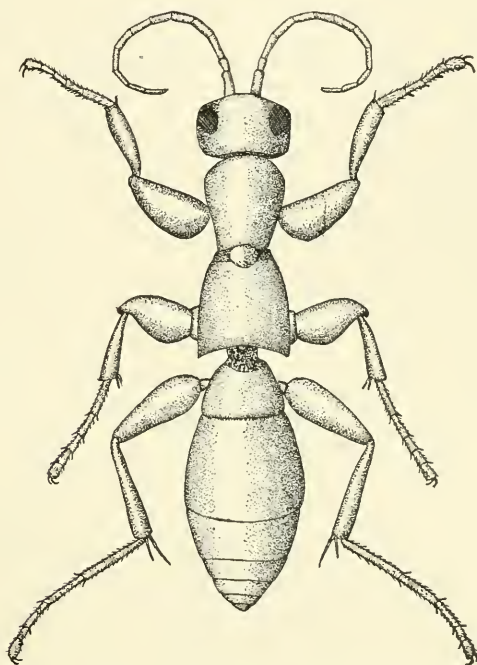


FIG. 4. *Algor heterodoxa*, new species; female.

the first and second segments like certain Cosilidæ (*Sicrolomorpha*) which it also approaches in the form of the head showing a connection between *Mystrocnemis* and its allies and the Cosilidæ.

***Parascleroderma nigra*, new species. (Fig. 5.)**

Female.—Length 2.3 mm. Black, with a bluish cast, especially on the head; scape and pedicel of antennæ honey yellow; basal four joints of flagellum and tarsi brownish. Head very flat, widest just behind the eyes where it is half as broad as long, slightly narrowed toward the rounded posterior angles; its upper surface shagreened. Eyes very small, oval, bare, placed near the lateral margin of the head, close to the anterior angles. Head just behind the insertion of each antenna with a rounded tubercle about the size of the eye, the space between these anteriorly regularly excavated. Antennæ 13-jointed, slender, scarcely twice the length of the head; scape elongate, thickened apically, as long as the four following joints. Pedicel a little longer than the

first flagellar joint, following growing barely longer and slightly thicker, the fourth about one half longer than wide. Prothorax widest just before the middle, sharply contracted anteriorly; posteriorly narrowed, with sharply dentate hind angles; above very convex; smooth, except at the posterior fifth

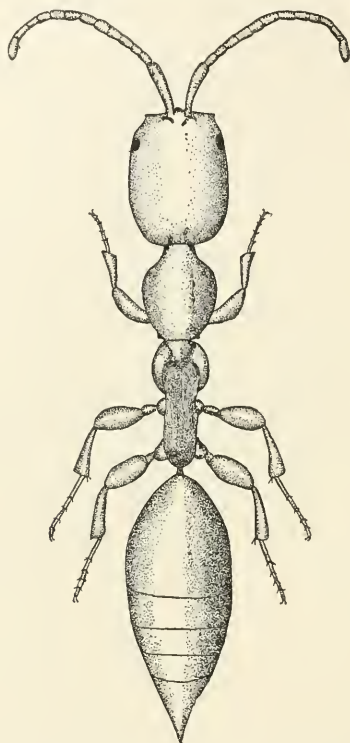


FIG. 5. *Parascleroderma nigra*, new species; female.

where it is punctulate or shagreened. Mesonotum short, narrow, convex, rugulose; the mesopleuræ visible from above as smooth convex crescentic pieces embracing the anterior angles and the base of the sides of the mesonotum, the latter elongate, with parallel sides, finely longitudinally aciculate, the lines curving toward the median line in front; posterior slope rugulose. Abdomen one fourth longer than the thorax, with a short, very slender petiole, second segment longer than the following three together; third to fifth subequal; following not clearly separated. Legs stout, the tibiæ all bare, not spinulose. Middle and posterior femora much thickened, broadest at the middle.

Described from a specimen collected by Dr. Hans Brauns at Bothaville, Orange Free State, May 5, 1899.

This resembles a *Pristocera* very closely, but belongs to *Parascleroderma* Kieffer which differs by the bare, non-spinulose tibiae.

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WESTCHESTER HETEROPTERA.—II. ADDITIONS, CORRECTIONS AND NEW RECORDS.

BY J. R. DE LA TORRE BUENO,

WHITE PLAINS, N. Y.

The *raison d'être* of this list is set forth in its predecessor. In this are given the fruits of the work of the season of 1909, including the winter of 1908-9. As will be seen, there are no less than 30 species added to those recorded last year, which brings the total up to 138 species for Westchester Co. When it is considered that Mr. E. P. Van Duzee's Buffalo list, the result of his collecting and that of others, yielded only 127 species for the families I enumerate, the present relation is not to be despised.

A number of corrections due to the ceaseless change of nomenclature have to be made. These will be noted in their proper places. The identification of forms of our fauna by means of the imperfect descriptions of the early hemipterists have saddled us at this day with a burden of misinformation which very fortunately is being reduced year by year by the labors, alas! not of our own, but of European entomologists. It appears to me a fundamental axiom that every entomologist, and very especially every hemipterist, before referring an American form to a genus peculiar to some other region of the globe, should make it his business to procure authenticated specimens of the type species of that genus. Then a careful comparison between the two forms should serve to settle the point

definitely. As it is, consider the labor necessary in hemipterology to settle beyond doubt the identity of some 30 or so species with European forms. A certain proportion of these, due to the labors of Dr. Horvath, are now decided definitely, although there is some question as to two or three of them, which Van Duzee has brought up in a recent paper.*

Superfamily *PENTATOMOIDEA*.

Family *PENTATOMIDÆ*.

Subfamily I. *ASOPINÆ* Schout.

Genus *PERILLOIDES* Schout.

1. *P. circumcinctus* Stål.

White Plains, July 3, nymph; 10th, adults and nymphs; 25th, adults.

Genus *MINEUS* Stål.

2. *M. strigipes* H. S.

White Plains, April 18, perched on a rock; July 4, 5, 10; Sept. 3, nymph in last instar; Sept. 5, 25 and 26.

Genus *APATETICUS* Dallas.

Van Duzee differs with Schouteden in regard to the arrangement of this genus, in the article cited. As to whether *Podisus* is entitled to full generic rank or is only a subgenus will have to be settled by the specialists. I defer to Van Duzee in his opinion, and rearrange our species accordingly.

3. *A. (Apæcilus) cynicus* Say.

White Plains, Aug. 30, in flight.

4. *A. (Apæcilus) bracteatus* Fitch.

No new record.

Genus *PODISUS* H. S.

5. *P. (Podisus) maculiventris* Say.

White Plains, Feb. 12, hibernating adults under a stone.

6. *P. (Podisus) modestus* Dallas.

No new record.

Subfamily *PENTATOMINÆ*.

Genus *BANASA* Stål.

7. *B. catinus* Dallas.

Scarsdale, May 25, swept under apple tree.

* Can. Ent., XLI, No. 10, pp. 369-375, Oct., 1909.

Genus **NEZARA** A. & S.8. **N. hilaris** Say.

White Plains, April 18, under a stone on a hillside. August 15 and Sept. 6, nymphs in the grasses in a marshy meadow.

Genus **THYANTA** Stål.9. **T. custator** Fabr.

Scarsdale, May 25.

Genus **COSMOPEPLA** Stål.10. **C. carnifex** Fabr.

White Plains, May 31, July 10, Sept. 26.

Genus **CÆNUS** Dallas.11. **C. delius** Say.

White Plains, Feb. 7, torpid under stones.

Genus **EUSCHISTUS** Dallas.12. **E. variolarius** P. B.

White Plains, Feb. 7 and 20, torpid.

13. **E. tristigmus** Say.

White Plains, Feb. 21, April 4, under stones.

14. **E. fissilis** Uhler.

Scarsdale, May 25, Rye Beach, Aug. 21.

15. **E. ictericus** L.

White Plains, Aug. 8, in a damp meadow.

Genus **SOLUBEA** Bergr. (*n. n.* for *Æbalus* Stål.)16. **S. pugnax** Fabr.

Rye Beach, Aug. 21.

Genus **MORMIDEA** A. & S.17. **M. lugens** Fabr.

White Plains, March 7 and April 18, under stones.

Genus **PENTATOMA** Olivier.18. **P. senilis** Say.

Rye Beach, Aug. 21.

19. **P. saucia** Say.

Rye Beach, July 17, adults and nymphs, on a fine grass growing in the higher parts of the salt marsh.

Genus *TRICHOPEPLA* Stål.

- 20.
- T. semivittata*
- Say.

Rye Beach, Aug. 21.

Genus *PERIBALUS* M. & R.

- 21.
- P. limbolarius*
- Stål.

The past year's observation repeated.

Genus *BROCHYMENA* A. & S.

- 22.
- B. quadripustulata*
- Fabr.

White Plains, March 28, under stone at foot of tree; May 9, under bark of apple log in a field.

Subfamily CYDNINÆ.

Genus *SEHIRUS* A. & S.

- 23.
- S. cinctus*
- P. B.

No new record.

Genus *AMNESTUS* Dallas.

- 24.
- A. spinifrons*
- Say.

White Plains, May 29, Swept from grasses.

- 25.
- A. pusillus*
- Uhler.

White Plains May 30, June 6.

Subfamily GRAPHOSOMINÆ.

Genus *AMAUROCHROUS* Stål.

- 26.
- A. cinctipes*
- Say.

White Plains, April 3, sifted under elder bush at edge of a marshy meadow.

Subfamily SCUTELLERINÆ.

Genus *EURYGASTER* Lap. de Cast.

- 27.
- E. alternatus*
- Say.

White Plains, May and June.

Genus *HOMÆMUS* Dallas.

- 28.
- H. æneifrons*
- Say.

White Plains, June 26.

Family THYREOCORIDÆ.

Genus *THYREOCORIS* Schrank.

- 29.
- T. unicolor*
- P. B.

Scarsdale, May 25.

30. *T. pulicarius* Germar.

White Plains, Feb. 12, sifted from leaves in the woods.

Family ARADIDÆ.

Subfamily ARADINÆ.

Genus ARADUS Fabr.

31. *A. robustus* Uhl.

White Plains, Oct. 31

32. *A. similis* Say.

White Plains, February, March, April, hibernating under bark of dead white birches. June 13, active under fungus.

33. *A. lugubris* Fallén.

White Plains, July 31, on fence.

Family COREIDÆ.

Subfamily MEROCORINÆ.

Genus CORYNOCORIS Mayr.

33a. *C. typhæus* Fabr.

White Plains, Sept. 3, nymph and adult at edge of marshy meadow, in field; Sept. 19, Oct. 9.

Subfamily ACANTHOCEPHALINÆ.

Genus ACANTHOCEPHALA Lap. de Cast.

34. *A. terminalis* Dallas.

White Plains, July 10, nymphs in second and third instars; 31st, full grown nymph; Sept. 6, the same.

Subfamily CENTROSCELINÆ.

Genus ANASA A. & S.

35. *A. tristis* de G.

White Plains, June 7, Sept. 26.

Subfamily MICRELYTRINÆ.

Genus PROTENOR Stål.

36. *P. belfragei* Hagl.

White Plains, May 15; June 26, nymphs in various stages. July to October, adults only.

Subfamily ALYDINÆ.

Genus MEGALOTOMUS Fieb.

37. *M. quinquespinosus* Say.

White Plains, July 10, Sept. 6 and 26.

Genus ALYDUS Fabr.

38. *A. eurinus* Say.39. *A. pilosulus* H. S.

The latest date for these in White Plains is Oct. 12.

40. *A. conspersus* Mont.

White Plains, June 6, Sept. 4.

Subfamily CORIZINÆ.

Genus CORIZUS Fall.

41. *C. lateralis* Say.

White Plains. Common in spring and late summer.

42. *C. nigristerium* Sign.

White Plains, August and September; nymphs as late as the 26th of the latter month.

Subfamily BERYTINÆ.

Genus NEIDES Latr.

43. *N. muticus* Say.

White Plains, July 10, adult and nymphs in last stage; July 18, nymph in last instar; Aug. 15 and 28, Sept. 6. In shrubbery at the edges of woods.

Genus JALYSUS Stål.

44. *J. spinosus* Say.

White Plains, April 4, dead under a stone; June 6, Sept. 26.

Family LYGÆIDÆ.

Subfamily LYGÆINÆ.

Genus LYGÆUS Fabr.

45. *L. kalmii* Stål.

White Plains, July 10.

Genus NYSIUS Dallas.

Since the date of the previous paper, a number of changes have been made in the nomenclature of this genus. Van Duzee has

reconsidered his synonymy of the form listed as *jamaicensis*, and Horváth has shown the identity of *angustatus* with a European species.

46. *N. ericæ* Schill. (= *angustatus* Uhl.).

White Plains, May 15 and 30; Sept. 25 and 26.

47. *N. providus* Uhl. (= *jamaicensis* V. D., not Dallas).

June to Sept.

Subfamily CYMINÆ.

Genus *KLEIDOCERYS* Westw. (= *Ischnorhynchus* Auctt.).

48. *I. geminatus* Say (= *reseda* of Am. authors, *nec* Panz).

White Plains, April 17, on sweet birches; May 1 and 15.

Dr. Horváth has found that our species is not identical with the European one.

Genus CYMUS Hahn.

In this genus Dr. Horváth's work has changed completely our conception of the American species.

49. *C. luridus* Stål.

White Plains, May 29 and 30, June 12, 19 and 26. Common in marsh grasses.

50. *C. angustatus* Stål.

White Plains, May 1, 15, 26 to 30, June; Scarsdale, May 25; Rye Beach, July 17. Common at all times.

This is the species that appeared in the previous list as *Cymodematabida* Spin.

51. *C. discors* Horv. (= *luridus* of previous list).

White Plains, July and August, very rare.

Subfamily BLISSINÆ.

Genus *ISCHNODEMUS* Fieb.

52. *I. falicus* Say.

White Plains, May 29, June 12.

Genus BLISSUS Klug.

53. *B. leucopterus* Say.

White Plains, Feb. 7 and 12, under stones in fields. May, sweeping. Rye Beach, Aug. 21.

Subfamily GEOCORINÆ.

Genus GEOCORIS Fallén.

54. *G. bullatus* Say.

White Plains, May 15 and 31, July 3.

55. *G. discopterus* Stål.

White Plains, May 15, Aug. 22, Sept. 3.

56. *G. uliginosus* Say (= *ater*, of Am. authors, *nec* Fabr.).

White Plains, May, August and September.

57. *G. piceus* Say.

White Plains, April 11, under stone, quite active. May, June, August. Rye Beach, Aug. 21.

Subfamily PACHYGRONTHINÆ.

Genus PHLEGYAS Stål.

58. *P. abbreviata* Uhl. (= *annulicrus* Auctt. for Am. form).

May to August.

Genus ŒDANCALA A. & S.

59. *Œ. crassimana* Fabr. (= *dorsalis* Say).

White Plains, June to September. Taken in large numbers in grasses in a marshy meadow, nymphs and adults in July and August.

Subfamily OXYCARENINÆ.

Genus CROPHIUS Stål.

60. *C. disconotus* Say.

White Plains, Oct. 3, another single specimen.

Subfamily APHANINÆ.

Genus LIGYROCORIS Stål.

61. *L. silvestris* L.

White Plains, throughout the summer. There may be more than one species under this name.

Genus PERIGENES Distant.

62. *P. constrictus* Say (= *fallax* Heid. *sec.* V. Duz.).

White Plains, September and October, in short grasses.

63. *P. costalis* Van Duzee.

White Plains, July 3, Sept. 25 and 26, Oct. 10.

Genus **HERÆUS** Stål.64. **H. plebejus** Stål.

April 4 and 11, under stones, hibernating. May 28 and 29, July 24, Sept. 25 and 26, Oct. 9 and 10; taken by sweeping on all these dates. Oct. 31, under stones.

Genus **ORTHŒA** Dallas (= *Pamera* Say).65. **O. basalis** Say.

White Plains, Feb. 1, hibernating under stones in field; June and July, September and October.

Genus **CLIGENES** Bergr.66. **C. minutus** Bergr.? (= *pilosulus* Stål?).

White Plains, April to early May, under stones; late May, swept in marshy fields. Scarsdale, May 25.

Genus **EMBLETHIS** Fieb.67. **E. vicarius** Harv.

White Plains, Sept. 3 and 4, running among grasses, at the roots; Nov. 8, under stones.

Genus **EREMOCORIS** Fieb.68. **E. ferus** Say.

White Plains, April 18, Sept. 6, Oct. 31, under stones.

Genus **SCOLOPOSTETHUS** Fieb.69. **S. atlanticus** Harv.

White Plains, May 15 and 30, June 6 and 12, July 5, at base of clumps of marsh-grasses.

Family **TINGIDÆ**.Subfamily **PILEMINÆ**.Genus **PIESMA** Lep. & Serv.70. **P. cinerea** Say.

White Plains, July 10 and August 28, swept from weeds.

Subfamily **TINGIDINÆ**.Genus **MELANORHOPALA** Stål.71. **M. clavata** Stål.

White Plains, June 26.

Genus **CORYTHUCA** Stål.72. **C. ciliata** Say.

White Plains.

73. *C. arcuata* Say.

White Plains, May and July.

74. *C. pergandei* Heid.

White Plains, May 15, June 12 and 30, on black alder.

Genus *LEPTOBYRSA* Stål.75. *L. explanata* Heid.

White Plains, June 6, nymphs; July 10, Aug. 28, ova; nymphs and adults, Sept. 6 and 26.

Genus *GARGAPHIA* Stål.76. *G. tiliæ* Walsh.

White Plains, May 26.

Genus *PHYSATOCHILA* Fieb.77. *P. plexa* Say.

White Plains, June 12. Swept in marshy meadow.

Superfamily *NEPOIDEA* Kirk.Family *NABIDÆ*.Genus *PAGASA* Stål.78. *P. fusca* Stein.

White Plains, July 25, Aug. 22 and 28, nymph; Sept. 4, 26 and 27.

Family *GERRIDÆ*.Subfamily *VELIINÆ*.

Owing to a slip of the printer, all the species were put under *Rhagovelia*. The correct division is as follows:

Genus *RHAGOVELIA* Mayr.79. *R. obesa* Uhl.Genus *MICROVELIA* Westw.80. *M. americana* Uhl.81. *M. capitata* Guér.82. *M. sp.* (= *pulchella* Auctt. for N. Am. form).Subfamily *GERRINÆ*.Genus *GERRIS* Fabr.83. *G. remigis* Say.

Occurs throughout the county and state.

84. *G. conformis* Uhl.

Mamaroneck, May 24.

Family HYDROMETRIDÆ.

Genus HYDROMETRA Latr.

- 85.
- H. martini*
- Kirk.

White Plains, May 9.

Family NÆOGEIDÆ.

Genus NÆOGEUS Lap.

- 86.
- N. concinnus*
- Uhl.

White Plains, May 15.

Family REDUVIIDÆ.

Subfamily EMESINÆ.

Genus EMESA Fabr.

- 87.
- E. longipes*
- de G.

White Plains, Aug. 28, Sept. 6.

Genus BARCE Stål.

- 88.
- B. annulipes*
- Stål.

White Plains, April 4, Aug. 31, Oct. 10, swept in a field; Oct. 31.

Subfamily ACANTHASPIDINÆ.

Genus REDUVIUS Lam.

- 89.
- R. personatus*
- L.

White Plains, July 3, on kitchen floor at night.

Subfamily PIRATINÆ.

Genus MELANOLESTES Stål.

- 90.
- M. picipes*
- H. S.

White Plains, April 18 and 25, under stones.

- 91.
- M. abdominalis*
- H. S.

White Plains, April 4 and 18, May 9.

Subfamily HARPACTORINÆ.

Genus ZELUS Fabr.

- 92.
- Z. luridus*
- Stål.

Scarsdale, May 25, nymphs.

Genus FITCHIA Stål.

- 93.
- F. nigrovittata*
- Stål.

White Plains, April 4, wingless form, under a hillside stone; June 12, one fully winged, swept.

Genus *ACHOLLA* Stål.

- 94.
- A. multispinosa*
- de G.

White Plains, April 14, nymph in last instar, on fence under trees.

Genus *SINEA* A. & S.

- 95.
- S. diadema*
- Fabr.

White Plains, Sept. 3, 11 and 26, Oct. 3.

Superfamily *MIROIDEA*.Family *ANTHOCORIDÆ*.Genus *PIEZOSTETHUS* Fieb.

- 96.
- P. sordidus*
- Reut.

White Plains, Sept. 26; Hartsdale, May 22.

Genus *TRIPHLEPS* Fieb.

- 97.
- T. insidiosus*
- Say.

Rye, Aug. 21.

Superfamily *NOTONECTOIDEA*.Family *NAUCORIDÆ*.Subfamily *NAUCORINÆ*.Genus *PELOCORIS* Stål.

- 98.
- P. femoratus*
- Pal. Beauv.

White Plains, July 25, nymph.

Family *NOTONECTIDÆ*.Subfamily *NOTONECTINÆ*.Genus *NOTONECTA* Linné.

- 99.
- N. insulata*
- Kirby.

- 100.
- N. undulata*
- Say.

White Plains, Dec. 5 and 20; Feb. 20, swimming under thin ice.

Genus *BUENOA* Kirkaldy.

- 101.
- B. margaritacea*
- Bno.

White Plains, Dec. 5 and 20, Feb. 22, March 7, swimming under clear thin ice.¹

¹ The appearance of the first volume of Kirkaldy's Catalogue has rendered obsolete the arrangement of the *Cimicidæ* (*Pentatomidæ*) and changed the names of a number of genera and species, but it is impossible to make the requisite corrections in the proof before me. J. R. T. B.

SOME MEXICAN HEMIPTERA-HETEROPTERA NEW TO THE FAUNA OF THE UNITED STATES.

BY H. G. BARBER,

ROSELLE PARK, N. J.

In the last few years I have obtained a number of Hemiptera, hitherto recorded only from Mexico or Central America, which have been taken in the extreme southern limits of New Mexico and Arizona. The addition of these to our fauna goes to swell the ever-increasing number of insects which are spreading northward from Mexico into the southern limits of the United States where the conditions are similar on either side of the border. The majority of the species which I desire here to record are a result of my collecting in the Huachuca Mountains, Arizona, in the summer of 1905.

Brochymena hædula Stål.

I took six specimens of this species in the Huachuca Mts., Arizona. It is very closely related to *B. arborca* Say. I have some doubt concerning their separation as distinct species. Stål in his diagnosis in Enum. Hem., 2, p. 17, points out that *hædula* differs in having the three lobes of head equal, the fore tibiæ expanded near their apices and the base of all antennal joints paler. The specimens before me have the pronounced dilatation of the anterior tibiæ, and with the exception of the possibly more pronounced armature of spines on the pronotal angle I can find no other constant differential character. In these specimens the base of the fifth antennal joint is not pale.

Euschistus spurculus Stål.

I have received a single specimen from the F. H. Snow Collection from San Bernardino Ranch, Cochise Co., Arizona, collected at an elevation of 3,750 ft. It agrees in every particular with Stål's description but is considerably paler than other specimens which I have from Durango, Mexico. Its occurrence within the United States was noted by Snow in the Trans. Kas. Acad. Sci., Vol. XX, Part I, 1906.

***Padæus irroratus* H. Schf.**

I have a single specimen collected by Dr. R. E. Kunze in the Huachuca Mts., Arizona, in 1899. I did not take this species in my collecting over the same territory in 1905. This is the specimen which Mr. Van Duzee determined for me and by mistake recorded from Florida in his "List of the Pentatomidæ of the United States."

***Cosmopepla binotata* Dist.**

A single specimen, collected by Dr. R. E. Kunze in the Huachuca Mts., Arizona.

***Chlorocoris* Spin.**

I can find no record of the occurrence of any member of this genus within the United States. I have four species to add. This genus is characterized by Stål as follows: Body more or less depressed, the lateral lobes of the head are longer than the median, the lateral angle of the prothorax acute and often spinose in character, ventral aspect of the abdomen provided usually with a more or less evident furrow, at least at base: apex of femora destitute of a spine.

***Chlorocoris subrugosus* Stål.**

Three specimens were collected by me in the Huachuca Mts., Arizona, in July. In this species the abdomen is not provided ventrally with a groove. The humeri are spinose.

***Chlorocoris hebetatus* Dist.**

I have two specimens of this species taken in the Huachuca Mts., Arizona. The humeral angle is almost a right angle and a pale yellowish median callosed line runs from the base of the head through the pronotum to the tip of the scutellum.

***Chlorocoris atrispinus* Stål.**

Several years ago I purchased from Mr. George Frank a specimen of this species labelled "New Mexico." In this species the head is long triangular and the lateral lobes rather acute. The humeral angles are drawn out into much more evident spines than in *subrugosus*.

***Chlorocoris rufopictus* Walk.**

This I found rather common in the Huachuca Mts., Arizona, and have been of the opinion that it is new, as it differs somewhat from

Walker's description and Distant's figure of this species. After more careful comparison with Distant's figure in the Biol. Cent. Am., I am convinced that the differences are mainly those of color, although the three lobes of the head are not of equal length as described by Walker for this species. Furthermore, there is no indication of an abbreviated pale ochraceous band on the front of the thorax as described by Walker nor a transverse sanguineous band posteriorly as depicted by Distant. Apical part of callosed ridge of scutellum and apex of scutellum itself and entire narrow lateral margin of connexivum ochraceous. Otherwise it agrees with Walker's description.

These four species may be differentiated in the following synoptic table.

Chlorocoris.

Ventral groove of abdomen more or less evident.

Head long triangular, with lateral lobes more acute.

Humeral angles drawn out into very acute spines; rostrum reaching the base of the third abdominal segment.....*atrispinus* Stål.

Head shorter, subconical, with apices of lateral lobes more or less evidently rounded; lateral margins of pronotum straight, with the humeral angle a right angle.

A distinct, median, slightly calloused, longitudinal, pale line running through entire length of pronotum and scutellum; lateral margins of pronotum serrated almost throughout; ventral groove of abdomen shallow, faintly outlined to base of sixth abdominal segment.

hebetatus Dist.

Apical one half of scutellum with a prominently elevated, pale, smooth ridge; lateral margins of pronotum distinctly serrated only about half way; ventral groove of abdomen much deeper and more evident to base of sixth abdominal segment.....*rufopictus* Walk.

Ventral groove of abdomen entirely absent. Head short and conical. Humeral spinose.*subrugosus* Stål.

Podisus marginiventris Stål.

This is not new to the United States, as Dr. Uhler from specimens collected in Colorado redescribed it under the name *gillettei* as pointed out by Mr. Van Duzee, who has himself taken it near Ft. Collins, Colorado. It is so rare that I cannot refrain from mentioning that two typical specimens were taken in the Huachuca Mts., Arizona.

Archimerus squalus H. Schf.

I took over fifty specimens of what I take to be this species in the Huachuca Mts., Arizona. It is rather broad, with the scutellum

yellow and the terminal segment of the antennæ sanguineous. The first segment of the antennæ is a trifle longer than the second.

Mamurius mopsus Stål.

Four specimens of this species were taken in the Huachuca Mts., Arizona.

Burtinus notatipennis Stål.

A single specimen was obtained in the Huachuca Mts., Arizona. After a very careful comparison of this specimen with Stål's description of *notatipennis* and Distant's *femoralis* I am fairly certain that the latter is a synonym of Stål's species. Stål, evidently through oversight, neglected to mention the series of ventral black spots on the abdomen, the four pronounced long, black spines of the posterior femora which are mentioned by Distant in his description. The single specimen before me has only a slight indication of a pale spot behind the middle of the corium and lacks the darker coloring beneath the head but in this is probably subject to variation. In all other respects this specimen agrees with the two descriptions. This species has dorsally a very close resemblance to *Megalotomus quinque-spinosus* Say.

Harmostes subrufus Dist.

I collected eight specimens of this species in the Huachuca Mts., Arizona. The basal segment of the antennæ extends about one third of its length beyond the apex of the head and the enlarged fourth joint is a trifle longer than the basal joint; the humeri are broadly rounded; the areas between the veins punctate and mottled with reddish brown; narrow reflexed costal margin of corium immaculate.

Xenogenus extensum Dist.

Two specimens collected in the Huachuca Mts., Arizona. They have the appearance of a long, narrow *Harmostes reflectulus* Say. The fourth segment of the antennæ is not much thickened and only slightly shorter than the third segment; the antenniferous tubercles are not produced nor spined; the ocelli are elevated; the anterior angle of the pronotum is not produced in a spine; the apical half of the posterior femora armed with some twenty-five sharp spines.

Stenomacra marginella H. Schf.

This species was very common in a garden in the Huachuca Mts., Arizona, where I found it feeding on *Asparagus*. The fore tibiæ

are usually armed with three spines near the apex. Distant in the *Biologia Cent. Am.* mentions the color variations of the legs. In the series of forty specimens before me the apical half of the hind femora, commonly the apical part of the middle femora and rarely the apices of the fore femora are blackish.

***Arhapha cicindeloides* Walk.**

I found this species rather common in the Huachuca Mts., Arizona, running about on the ground among the dead leaves. It is about the size of and very closely resembles *A. carolina* H. Schf. The anterior lobe of the pronotum is whitish tomentose and the white markings on the wing covers are similar in the two species. But in *cicindeloides* the head, seen from above, is larger, more globose and impunctate; in *Carolina* the head is furnished with large, rather scattered punctures, and the membrane of the wing covers is somewhat more developed.

***Leptoypha brevicornis* Champ.**

Common in the Huachuca Mts., Arizona. The differences between this species and our *L. mutica* are pointed out by Champion.

***Dichocysta pictipes* Champ.**

In this species, which was obtained in the Huachuca Mts., Arizona, the pronotum is furnished on either side with a very large bulbi-form process. It has otherwise much the appearance of one of the *Teleonemias*.

***Teleonema variegata* Champ.**

Four specimens of this characteristic species were taken with the preceding.

Mr. O. Heidemann kindly determined these three species of *Tingitidæ* for me.

***Homalocoris guttatus* Walk.**

Dr. Henry Skinner obtained a single specimen of this species in the Huachuca Mts., Arizona. This specimen differs from Champion's figure in the *Biologia Cent. Amer.* in having the red spots on the posterior lobe of the pronotum more elongate and oblique.

***Apiomerus longispinus* Champ.**

This species was very common in the Huachuca Mts., Arizona. It is black with a pale spot at each lateral incisure of the abdominal

segments. Its characters are sufficiently indicated by Champion.
Milyas spinicollis Champ.

This was collected by Professor E. B. Wilson, of Columbia University, in the Grand Cañon of the Colorado along Bright Angel Trail.

Milyas inermis Champ.

Collected by Dr. Henry Skinner and by Mr. C. Schaeffer, of the Brooklyn Museum, in the Huachuca Mts., Arizona, to the former of whom I am indebted for a specimen. This and the preceding species agree in every particular with Champion's descriptions and figures in the *Biologia Centrali-Americana*.

NOTES ON BREEDING HEMIPTERA.

BY CHRIS. E. OLSEN,

MASPETH, LONG ISLAND, N. Y.

1. *Cosmopepla carnifex* Fabr.

During the summer I found a number of Hemipterous nymphs of this species in their last instar feeding on moth mullein (*Verbascum blattaria*). In a few days they matured and proved to be the common *Cosmopepla carnifex* Fabr. The bred specimens and others freshly collected were placed on a moth mullein in a pot covered with a wire screen. The first egg mass was laid on the screen. The youngsters were not able to locate the food plant and soon died. The plant itself did not thrive indoors, so thereafter I supplied freshly picked leaves each day, confining the insects in a pint jar covered with muslin. Eggs were deposited in very irregular masses, 4 to 15 per mass, on any part of the plant which the mothers chose on the upper or under side of the leaf, stem, seed pod or flower bud. In all I secured 69 eggs, but these were deposited by more than one mother. August 20 a batch of eggs was laid on the stem evenly in almost straight lines, two by two. This was rather unusual. They were light apple green, translucent, resembling in nature white grapes, but less oval, more cylindrical, rounding quickly at the ends. The color gradually turned yellowish as the embryo developed and all hatched

August 27. The young lingered two days on the empty egg-shells, then began to feed. August 30 one died, apparently having fallen to the bottom of the jar and being unable to recover its position after landing on its back. August 31 all had their first moult and were much increased in size. They were far more lively and congregated on a green seed-pod which they seemed to prefer to the young shoots and tender leaves. The second moult occurred September 6, ten survivors staying by their seed-pod in a lusty and lively condition. September 11 the third moult occurred. After just emerging from the exuvia the body was light and pale, the thorax, legs and antennæ were very light cream color, but in twenty minutes the antennæ and legs had become entirely black, while the abdomen was greenish with red and yellow markings. The eyes were dark red. The fourth moult occurred September 18 and the first imago appeared September 27. All but one had emerged by September 29, the last delayed until October 1. The period from egg to imago therefore covered 37 to 42 days.

2. *Podisus maculiventris* Say.

August 7 I took a pregnant female of this bug. It had lost one hind leg and the last joint of the left antenna so that this organ was rendered useless. Its joints were motionless, each slightly bent away and the whole carried at an awkward angle from the head. The other antenna was in constant motion. Next day 27 eggs were deposited on the jar. Their color was light yellow green with bronzy metallic reflections and with many short black hairs. On the top a row of longer white hairs, curved outward, were set around in a perfect circle. This looked like a spherical cover to the egg, which resembled under the lens some tinsel Christmas-tree ornament. August 9 a mass of 9 and another of 16 eggs were laid. The first batch of young, which hatched August 13, was very light salmon yellow just after emerging. Other batches comprising 27 and 22 eggs were laid. The next day the first born left their shells to hunt for food. The mother had a habit of playing her good antenna over and upon the youngsters, which showed no alarm. On the twenty-first the mother died, presumably of old age, having bequeathed to posterity 8 egg masses of 168 eggs in all. The smallest batch was 9 and the largest 27. The smallest batch and one of 16 were laid the same day and perhaps ought to be regarded as a single mass, making

an average of 24 eggs per mass. A batch of youngsters in a separate jar all died in about a day. This was apparently due to the lack of vegetable food which they needed in the early stages, but possibly the dry soil absorbed the moisture of the air too freely, as the jar was lightly covered. Another jar continued to be well populated with nymphs of all ages. The young thrived partly on vegetable food but were also cannibalistic apparently in all stages. The first imago appeared September 7, making a life cycle of about 30 days, but others continued to appear until the eighteenth. No doubt indoor breeding, with steady temperature and plenty of food, hastened development. A newly matured bug deposited an egg mass on a stem the next day.

The food of this species is mainly if not almost entirely Lepidopterous larvæ. Mr. Franck observed on Staten Island a wholesale mortality of potato beetle larvæ, with abdominal contents sucked out by a bug, probably this species, but he took none home for positive identification. Mr. Dow has observed *Podisus maculiventris* attacking beetles (*Adalia bipunctata* and *Epitragus arundinis*). The beaks were thrust into the soft tissue between the thorax and elytra and the beetles seemed to offer no resistance whatsoever. Mr. Wm. Davis reports this species with a small snout-beetle on its beak. Prof. J. B. Smith mentions a *Podisus* with its beak in the abdomen of a large carpenter ant (*Camponotus*). I have observed *maculiventris* preying upon larvæ of cabbage butterflies, tussock moths, *Alypia octomaculata*, and various noctuids and geometers. In captivity, cannibalism destroyed almost my whole colony. A nymph in the second or third instar attacked a much larger one and almost succeeded in killing it. Another nymph attacked an adult, but the latter escaped by superior mobility. They attack their prey from behind, sometimes stalking their victim for a considerable distance. When in a favorable position they thrust the beak quickly and directly. I have seen them also assail Lepidopterous larvæ at the side of the last abdominal segment. At the first feeling of the beak the caterpillar would sway from its position as rapidly as possible. Master bug took advantage of this method of defence by standing with extended beak and soon the caterpillar would impale itself. Escape by flight was then impossible. I have observed a caterpillar dragging along four nymphs of considerable size. I saw

one nymph attack a very hairy young caterpillar, but the hairs were too long or the beak too short and after a prolonged effort the bug abandoned the attack. I have not observed this bug eating vegetable food while mature or in the last instar; in younger stages, however, I have seen it with its beak in the green stems of evening primrose (*Onagra biennis*) and moth mullein and in the leaves of other plants. One nymph remained four minutes with its beak in a freshly cut stem of evening primrose.

I had an opportunity to observe a pair of *Podisus maculiventris* courting and copulating. The male started off by walking right over to the female. He showed signs of great affection by rubbing his head against her body several times. Then he strode diagonally across her and began to caress her from the other side. After a short time he turned towards her posterior end and lifted her abdomen up by pushing his head under it. Both insects then remained in this position for a short time, the male continually knocking his head up against the female's abdomen and lifting her higher and higher. During this performance the male's penis was protruded and he gave signs of great excitement by expanding and contracting his body and turning almost completely around. When this excitement was at its height, he crawled out to one side, and still keeping part of his body under the female, till he was far enough out to turn sidewise, he inserted his organ in her vagina. The lock was complete and he then turned completely downward so that the two insects were end to end. The male then played his legs on the female's dorsum like a pair of drumsticks. This performance occurred at very frequent intervals in the beginning, then every minute or so, but gradually the movements ceased or were repeated only now and then. The pair remained *in copulâ* all night on the very same spot.

A NEW SPECIES OF CHRYSOBOTHRIS (COLEOPTERA) FROM MAINE.

By C. A. FROST,

SOUTH FRAMINGHAM, MASS.

Chrysobothris verdigripennis, new species.

Form broader and less depressed than *dentipes*, broadest behind the middle, subdepressed; color of punctured spaces of elytra and thorax varying from a verdigris green to brassy or cupreous, costæ and callosities black or very dark bronze, beneath brassy green to coppery; antennæ green, sometimes becoming bronzed toward the tip, joints four to eleven with the lobes reddish testaceous, the testaceous area increasing gradually from the fourth to its maximum on the apical, third joint as long as the next two; front flat, greenish, densely punctured with two small callosities, white pubescence above (♂); or slightly convex, greenish bronze, more coarsely punctured and with two large callosities and many small ones (♀); clypeus broadly and deeply triangularly emarginate, sides nearly truncate; thorax twice as wide as long, generally wider at the base than the apex, arcuately narrowed at the apex, obliquely and slightly at the base, sides at the middle parallel, slightly sinuate, a rather wide median dorsal sulcus generally closed at the base by the joining of the broad slightly elevated lateral callosities, irregular and variable callosities and plicæ at the sides, disk moderately convex; elytra wider than the thorax, widest behind the middle, from apical third narrowed arcuately to the obtuse apices, sides slightly sinuate at middle, margin serrulate, disk moderately convex, sutural costa entire from near the middle, gradually more elevated to apex, second and third costæ indicated by short ridges and callosities joining each other and the first costa, fourth costa distinct to near the humerus but interrupted, depressed places coarsely and very irregularly punctured, with many smooth places, basal foveæ feeble; abdomen beneath sparsely pitted with coarse elongate punctures which are laterally confluent and form crenulate ridges at the sides of the abdomen, sparsely hairy, lateral callosities distinct; metasternum more closely and finely punctate anteriorly; front margin of the prosternum slightly sinuate, sides with coarse punctures and interlacing smooth spaces; anterior femur with a strong, rather obtuse tooth at tip, distal margin indistinctly crenulate; last ventral with serrulate margin. Length 13 to 14 mm.; width at apical third 5.5 to 6 mm.

Male.—Prosternum pubescent, densely, coarsely punctured with a tendency to form rugæ near anterior margin, usually a small smooth space at middle; anterior tibia arcuate, gradually thickened to tip; near the apex there is an acute tooth set obliquely across the inner face of the tibia from the inner posterior edge, the distal edge of this tooth is continued from the base and forms the inner edge of the apical tooth which is slightly back from the front

margin of the tibia; inner front edge of tibia sinuate; middle tibia arcuate, dilated on the inner edge from beyond the middle to the tip, sinuate before the tip; posterior tibia slightly arcuate; last ventral broadly semi-circularly emarginate, last dorsal sparsely and finely punctate, nearly smooth at middle, acutely and deeply emarginate.

Female.—Beneath sparsely hairy, punctuation more coarse; anterior tibia arcuate, gradually thickened to tip, middle very slightly arcuate, slightly thicker at tip, posterior straight; last ventral more densely punctured, emargination rather deep but narrow, ventral callosities more prominent, last dorsal more closely and coarsely punctured, with a slight notch.

This species is very distinct in the peculiar formation of the tooth of the fore tibia which is much more acute and prominent than anything I have seen in this genus. The correct shape of the tooth can only be seen when the tibia is straightened so that the inner face is exposed. The species resembles *dentipes* in the testaceous areas of the outer joints of the antennæ, but are smaller than in that species. The fore tibia is also somewhat similar in *dentipes*, but the strong tooth is lacking on the small oblique ridge of the anterior tibia. The middle tibia is dilated in a similar manner but the dilation is less abrupt in *verdigrispennis*. In sculpture and to a less extent, in form, it resembles *scabripennis* but it is more convex and in bulk nearly twice that species. The majority of the specimens seen were green but my series show a perfect gradation from green to dark bronze.

I have seen two green females in the LeConte collection at Cambridge, one of which, labelled "Me.," is much like the type, and the other, labelled "H. B.," is smaller (12 mm.). There was a green female in the collection of Roland Hayward at Cambridge, placed in the series of *dentipes* and labelled "Me." A green male which was placed in the general collection in the series of *scabripennis*, is probably the specimen referred to by Dr. Horn in his monograph on page 89. It is marked "Ex col. H. G. Hubbard," with no locality. There is also a female specimen in the collection of Frederick Blanchard, taken at Tyngsboro, Mass., July 12, 1896.

Seven males and one female were taken at Wales, Maine, July 23, 1908, in a clearing where large hemlocks were being cut and peeled. There were also many beeches and other hard woods in excess of the hemlocks. The specimens were resting on the trunks of the beeches at the edges of the clearing in the hot sun and were rather difficult to capture.

The following distribution of the specimens has been made: the

type, a green male, in the Museum of Comparative Zoölogy at Cambridge; a male in each of the collections of Mr. Blanchard, Tyngsboro, Mass., Prof. Fall, Pasadena, Cal., and Mr. Gustave Chagnon, Montreal, Can.; the three remaining males and the female are in my collection.

ON CHRYSOBOTHRIS CALIFORNICA AND ALLIES.

BY H. C. FALL,

PASADENA, CAL.

In my List of the Coleoptera of Southern California reference is made to the taking in the San Bernardino Mts. of a specimen of *Chrysobothris californica* from its burrow in the dead twigs of *Pinus ponderosa*. The identification was based on Horn's table and description and seemed satisfactory. A little later a second specimen taken in the same region was identified for me by an eastern specialist as *californica*. The two specimens looked much alike, and the identification was accepted without question. From time to time other specimens were added to my series, until it began to take on a somewhat mixed appearance, and a recent critical examination has convinced me that no less than three distinct species were involved. To determine which was the real *californica* comparison was made this past summer with the LeConte type at Cambridge. Imagine my surprise at finding that neither one of the three was identical with the type. One of my species proved to be *caurina* Horn (not quite typical however), while the other two were new and will be described in the present paper.

Further investigation among the allied species revealed a condition of affairs wholly unexpected. Notwithstanding the deliberate and painstaking work of Horn in his treatment of this genus, errors of such a nature exist in the table and descriptions of certain species in this part of Group IV as to make it quite impossible for the student correctly to identify his material thereby. Three species are involved in these errors, which are briefly as follows:

Californica.

This is placed in the group with lobed prosternum. The prosternum is really completely devoid of any trace of a lobe. The form of the apical dilatation of the front tibia of the male is also incorrectly described. The species described by Horn as *californica* is—in these two respects at least—the *monticola* of the present paper.

Caurina.

Placed by Horn in the group with prosternum not lobed. There is an evident lobe in all specimens examined by me, including examples from the type series kindly sent me for study by Dr. Skinner.

Carinipennis.

The anterior tibiæ of the male are said to be deeply sinuate at the base of the dilatation. The type shows no such sinuation. These are fundamental characters, and if misapplied the situation cannot be saved by any amount of fidelity as to other details. The species *trinervia* to *californica* of Group IV are therefore retabulated below, and with them are included four new species which fall within the same limits. In interpreting the form of the prosternum the faintest possible arcuation of the anterior margin is not to be considered a lobe, but anything suggestive of a lobiform prominence, no matter how short, is to be thus construed. A small amount of individual variation in this particular has been observed, but with some experience, especially if several examples are at hand, there should be no great difficulty in deciding to which group a given specimen belongs.

KEY TO SPECIES TRINERVIA—CALIFORNICA OF HORN'S GROUP IV.

- A. Prosternum not lobed in front, the anterior margin at most very broadly and feebly arcuate at middle; anterior tibiæ of male not or but slightly sinuate above the apical dilatation.
 - B. Tibial dilatation of male narrow and long, one third the length of the tibia; eyes widely separated above; body beneath bronzed, size larger (about 17 mm.)*californica* Lec.
 - BB. Tibial dilatation evidently less, usually much less than one third the length of the tibia; eyes less widely separated above, always by a distance which is distinctly less than half their vertical length; size smaller (rarely as much as 14 mm.).
 - C. Antennæ with joints 4-11 in part testaceous; apical dilatation of front tibia of male dentiform*verdigrispennis* Frost.
 - CC. Antennæ entirely dark, usually with metallic lustre throughout.

- D. Prosternum sparsely pubescent, not densely punctate in either sex; tibial dilatation rather narrow; under surface typically green*carinipennis* Lec.
- DD. Prosternum densely punctate and rather densely pubescent in the male; tibial dilatation shorter and broader.
- E. Prothorax more abruptly narrowed in front than behind; sculptured areas of elytra not very densely punctate, smooth spaces narrower, body bronzed beneath.
trinervia, Kby.
- EE. Prothorax as abruptly or even more abruptly narrowed behind than in front; punctured spaces of elytra very densely punctate and dull, smooth areas broader; body beneath bright green in the male, blackish green in the female.*sylvania* n. sp.
- AA. Prosternum with a short broad lobe in front.
- F. Tibial dilatation rather abruptly narrowed before the apex; emargination of last ventral of female limited at bottom by a thin slightly projecting and deflexed plate; prosternal lobe very short.
caurina Horn.
- FF. Tibial dilatation of male not abruptly narrowed before the apex; last ventral of female without apical plate.
- G. Tibial dilatation of male short and broad, a little sinuate on its inner margin, the apical angle mucronate, tibia deeply sinuate at base of dilatation; prosternal lobe very short.*breviloba* n. sp.
- GG. Tibial dilatation rather strongly arcuate internally, the tibia a little narrowed at base of dilatation, but not evidently sinuate; prosternal lobe stronger.....*monticola* n. sp.

C. californica Lec.

Seven specimens are placed over this label in the LeConte collection, the series standing precisely as left by Horn, who worked over the material while preparing his monograph of the genus. The first in line and bearing the name label is unquestionably the original type of LeConte. It is a male, 17 mm. in length, sculpture cupreous, beneath also coppery, eyes separated above by somewhat more than half their vertical length; prothorax widest just before the base, sides converging a little in front and sinuate at middle, dorsal channel deep with broad smooth callosity each side reaching from the apex three-fourths to the base; elytral sculpture of the same type as in related species, very densely punctate, smooth spaces not strongly elevated, sutural costa entire; prosternum without the faintest indication of a lobe in front, dilatation of front tibia unusually long and narrow, one-third the length of the tibia, which is not at all sinuate

at the base of the dilatation; pygidium coarsely punctate, subcribrate near the edge, which is irregular from the coarseness of the sculpture. The clypeal emargination is quite deep and of a form somewhat suggestive of that of *femorata*. The second and third specimens in the LeConte series are females, similar in size (one even larger) and appearance to the male type and probably identical with it. In one of them the eyes are as widely separated as in the type, in the other rather less so; the clypeal emargination also shows less approach to the *femorata* type. They are labeled simply "Cal." The fourth specimen is the type of *vulcanica* Lec. which Horn suppresses as a small form of *californica*. It is evident that in making this statement Horn had in mind the large size of typical *californica*, but as the length of *vulcanica* is 15 or 16 mm. and the measurements given by him for *californica* are 10-19 mm., the force of the remark is not

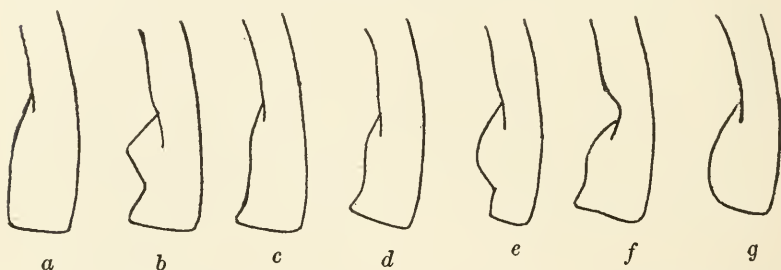


FIG. 1. Outline drawings of apex of fore tibia of the following species of *Chrysobothris*; a, *californica*; b, *verdigripennis*; c, *carinipennis*; d, *trinervia* and *sylvania*; e, *caurina*; f, *breviloba*; g, *monticola*.

apparent. It is by no means certain that *vulcanica* is the same as *californica*, but it must go as placed until males have been properly associated. The type is a female without antennæ or front legs; it resembles *californica* considerably but the prothorax is more densely rugosely sculptured, the smooth spaces each side of the median groove are encroached upon by the punctures and are therefore small and not very well defined; the sutural costa of the elytra is obsolete in fully basal half and the other costæ are even more undeveloped. The eyes are a little less distant than in *californica*, the prosternal margin not lobed, though faintly more prominent at middle. The last ventral is rounded at apex without trace of an emargination, probably an accidental variation. The specimen is from Oregon.

The fifth example in line is also from Oregon, is a female, and looks a good deal like *vulcanica*, which it probably is; it has the last ventral with a narrow and small but rather deep emargination.

The sixth specimen is a female with lobed prosternum, identity doubtful, certainly not *californica*, and the seventh is a male *caurina*, or a species so close to *caurina* that we are unable at present to separate them.

Since returning to California there has turned up in a small series of specimens sent me by Dr. Van Dyke two examples of genuine *californica*, both females, and a third specimen—also a female—has been sent by Dr. Blaisdell. Dr. Van Dyke's specimens are from Independence Lake, Nevada Co., California, at an altitude of 7,000 ft.; and Dr. Blaisdell's comes from Shasta Co. Dr LeConte's type was obtained from Murray, but neither it nor his other specimens bear any more definite locality label than "California."

C. verdigripennis Frost.

The discovery in New England at this late day of a new *Chrysobothris*, and one of the very finest of the group to which it belongs, is as interesting as it is surprising. Its detection is due to Mr. Frederick Blanchard, who having seen males taken by Mr. Frost, recognized a female in his own collection, and later found two or three specimens in the Cambridge collections mixed with other species. Mr. Frost's description (on a preceding page of this issue) is well drawn up and leaves very little to be said by way of characterization. The partly testaceous antennæ will at once distinguish it from everything except *dentipes*, with which it would be associated by Horn's table. In the latter species the apical dilatation of the male front tibia is quite different, the elytral punctuation denser and the prosternum is very sparsely punctate in both sexes; *verdigripennis* however seems to me less closely allied to *dentipes* than to *trinervia* and the neighboring species, and I have therefore included it in the preceding table.

C. carinipennis Lec.

The dilatation of the anterior male tibia in this species is longer and narrower than in any other allied form except *californica*, and comprises fully one-fourth the total length of the tibia. There is no appreciable sinuation at the base of the dilatation in the type, and

allowing for a moderate amount of individual variation it is probable that the tibia is never deeply sinuate, as it is described to be by Horn, who, I think, must have mixed individuals of two species. The prosternum of the male is sparsely punctate or nearly smooth along the middle, a rare character in this group and one that does not obtain in any of the other species here tabulated. Typical *carinipennis* is bright green beneath, and it is by no means certain that the specimens with under side bronzed or coppery are identical; these should receive further study.

C. sylvania, new species.

Closely allied to *trinervia*, but rather broader and heavier, the color beneath bright green in the male, dark green with cupreous reflections in the female; prothorax as abruptly or even more abruptly narrowed behind than in front; elytral costæ not as distinctly elevated as in typical *trinervia*, the smooth spaces sharply defined, the punctured areas more densely punctate than in *trinervia*; sexual characters as in *trinervia*. Length 11.5-11.8 mm.; width 5-5.1 mm.

Described from two males and two females collected by Mr. L. E. Ricksecker at Sylvania, California. Two of the four specimens differ a little from the type pair but are probably identical.

C. caurina Horn.

The form of the apical dilatation of the front tibia of the male, and of the apex of the last ventral of the female are peculiar to this species. This last does not seem to me to be very aptly described by Horn, who says in his table that there is "a well-marked transverse ridge in front of the notch." This apical ridge or carina consists of the free edge of the terminal portion of the submarginal serrate ridge, which is feebly developed laterally, leaving the apical portion where it cuts across the bottom of the emargination, smoothly outlined and a little deflexed, and is best seen when looked at from behind and nearly in the axial line of the body.

There are in the collection of Dr. Fenyès and myself some fifteen examples which I refer to *caurina*, as the sexual characters are virtually identical, yet not one of them is exactly like the typical examples sent me for examination by Dr. Skinner. Further study with sufficient material may show that our aggregate under this name is composite.

C. breviloba, new species.

Similar in form, size, sculpture and color of upper surface to *carinipennis*, from which it differs most essentially in the modification of the anterior tibiae in the male. The apical dilatation is here as wide as long, constituting about one fifth the length of the tibia, which is typically deeply sinuate above the dilatation. The color of the under surface is dark bronze or cupreous, with at most faint greenish reflections along the ventral sutures; prosternum with a faint incipient lobe in front, densely punctate and hairy in the male, more sparsely punctate, more convex and less hairy in the female as usual. The smooth areas of the prothorax are well defined, those of the elytra numerous but not large, well defined and contrasting sharply with the densely punctate areas; the pygidium is moderately closely punctate in the male, densely so in the female. In *carinipennis* the color beneath is typically brilliant green throughout, but is bronzed in some examples (unless perchance these are representatives of a closely allied species which we have not yet been able to separate), the prosternum is not evidently lobed, thinly hairy, and sparsely punctate or smooth along the median line, even in the male, a quite unusual character; the smooth areas of the upper surface are everywhere smaller or less sharply defined, the pygidium rather finely and quite sparsely punctate in the male, more closely so in the female. In the series of *breviloba* at hand the length varies from 9.8 to 12 mm.; width from 4 to 4.8 mm.

As compared with *monticola*, *breviloba* is a distinctly smaller species, the eyes less approximate on the vertex, their distance apart being evidently greater than the maximum width of the eye, and about equal to half their distance apart at the middle of the front; the smooth areas of the elytra relatively numerous (only about five or six in number on the disk in *monticola*), the sutural interval with alternating smooth and punctured spaces (punctate throughout or nearly so in *monticola*), prosternum less evidently lobed in front; dilatation of both front and middle tibiae of different form.

The series of *breviloba* before me comprises six males and four females, all from Colorado (Glenwood Springs, Buena Vista, Boulder, Florissant, Cañon City).

In a few males the sinuation of the front tibia is less deep than in the typical form, the *dilatation* however being of the same shape; these may possibly prove distinct, but I am unable to characterize them distinctly with the few specimens at hand.

C. monticola, new species.

Moderately elongate, subdepressed, black, punctured areas cupreous, beneath bronzed or cupreous, lateral callosities of abdomen purplish. Antennae more slender externally, greenish or cupreous in the male, darker

bronzed, becoming blackish apically in the female, third joint barely as long as the next two. Front densely punctate with two callosities which are larger in the female, flat and cupreous or greenish in the male, more convex and darker bronzed in the female. Eyes rather narrowly separated at summit, their minimum distance apart about two fifths the length of their inner side and subequal to their median width. Clypeus triangularly emarginate, the notch somewhat rounded at bottom. Prothorax nearly twice as wide as long, narrowed at apex and base, sides at middle nearly straight and parallel for a greater or less distance; median line sulcate, densely punctate in apical two thirds, smooth at base, a very narrow smooth line extending forward a variable distance; groove limited each side by a broad feebly elevated space, which is smooth in front; exterior to this two more or less connected and irregular callosities; surface elsewhere densely punctured. Elytra wider than the thorax, very nearly twice as long as wide, first costa entire, becoming broader at base, the sutural interval punctate throughout; second and third costæ interrupted; punctured areas densely punctate, smooth areas not very numerous and rather large. Prosternum lobed in front, densely punctate in both sexes; abdomen sparsely punctate; anterior femur with moderate tooth, which is serrulate externally; last ventral with more or less evident submarginal ridge, the lateral margin serrulate. Length 11-15 mm.; width 4.5-6.5 mm.

Male.—Prosternum flatter, more hairy and a little more finely punctate. Anterior tibia curved, apical dilatation barely one fourth the length of the tibia and arcuate in outline, the tibia slightly narrow at the base of the dilatation but not obviously sinuate; middle tibia feebly arcuate beyond the middle, gradually broader at apex; last ventral segment deeply semicircularly emarginate; last dorsal with a moderately broad median notch.

Female.—Prosternum less flat, less hairy, and usually more coarsely and a little less densely punctate; tibiae unmodified, last ventral with a small apical emargination, last dorsal more densely punctate and with a smaller narrow median notch.

Described from six males and four females in Dr. Fenyès' and my own collection. It occurs on pines in the California Sierras, about Lake Tahoe and in the San Bernardino and San Jacinto Mts.

As I have pointed out previously, this species is the one which best fits Dr. Horn's description of *californica*, and I might about as well have referred to that description and saved myself the trouble of writing a new one, but for the desirability of having here a complete description for comparative purposes. The true *californica* differs distinctly in its nonlobed prosternum, narrower and longer tibial dilatation, and more widely separated eyes.

The form of the prothorax is somewhat variable in *monticola*, as it is in most if not all of the allied species; it is usually as above described, but in some specimens the sides are nearly straight and convergent from the post-apical dilatation to the base.

STUDIES ON SYRPHIDÆ.—I. SYRPHUS ARCUATUS FALLÉN AND A RELATED NEW SPECIES.

By RAYMOND C. OSBURN,

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(WITH PLATE I.)

Concerning the species *Syrphus arcuatus* Fallén there has always been much confusion. Not only have the color variations, which here have a wide range, given rise to a number of synonyms, but the species has been confused with other members of the genus. A number of years ago the writer began collecting material in order to study the species, and, while examining a male of what I had supposed was *arcuatus*, I was much surprised to find an area of enlarged facets on the eye as in the *Catabombas*. Examination of the rest of my collection at once revealed several more males in the same condition. When I attempted to remove these from *arcuatus* I found that some of them had a strongly curved third vein, while others had this vein straight. Here was more trouble, for Williston (Syn. N. A. Syrphidæ, pp. 68-9) had made use of this difference in venation as the basis for his two varieties *arcuatus* and *lapponicus*. The following dilemma now presented itself: if I separated the males by means of the eye characters (a supposed generic difference separating *Catabomba* from *Syrphus*) some of either lot had curved veins and I could not separate the females at all; if I separated them on the basis of the venation the females could be placed as readily as the males, but in each group some of the males had the area of enlarged facets and some lacked it. A careful examination of my material of both sexes revealed a number of minor differences correlated with the venational differences but none with the differences in the eye facets.

Not being satisfied with the study of my own material merely, I obtained the loan of specimens from many American dipterologists as well as all those in the U. S. National Museum and the American Museum of Natural History, and a number of specimens from Europe. My thanks are due for the loan of material and for other assistance to Messrs. S. W. Williston, C. W. Johnson, Jas. S. Hine,

D. W. Coquillett, N. Banks, E. L. Dickerson, R. V. Harvey and B. G. Elliott among the American entomologists, and Dr. Theodore Becker, Liegnitz, Germany, Professor Mario Bezzi, Turin, Italy, and Mr. E. E. Austen, of the British Museum.

The following redescription of *Syrphus arcuatus* is drawn from about fifty specimens, both American and European, covering a wide range in distribution, and dealing only with essential diagnostic characters.

***Syrphus arcuatus* Fallén.** (Pl. I, Figs. 1, 2, 3 and 7.)

FALLÉN, Syrphici, 42 (*Scæva arcuata*).

MEIGEN, Syst. Besch., III, 302 (*Syrphus arcuatus*).

ZETTERSTEDT, Ins. Lapp., 598 (*Scæva lapponica*).

WALKER, List, etc., III, 579-80 (*Syrphus agnon*, *alcidice* and *arcuncinctus*).

SCHINER, Verh. Zool.-Bot. Ges., VII, 344 (*Syrphus arcuatus* and *lapponicus*).

O. SACKEN, Proc. Bost. Soc. Nat. Hist., XVIII, 149; West. Dipt., 326 (*S. lapponicus*).

GIRSCHNER, Wien. ent. Zeit., III, 187 (var. *bipunctatus*).

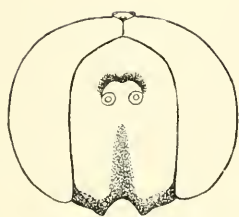
RONDANI, Att. Soc. Ital. Milano, VIII, 135 (*Syrphus lapponus*).

WILLISTON, Syn. N. A. Syrph., 68-9 (the var. *lapponicus* only).

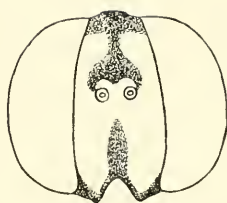
VERRALL, Br. Flies, Syrphidæ, 380 (*arcuatus* and var.? *lapponicus*); idem, Catalog, 61-2 (as two species).

OSBURN, Canad. Ent., XXXVI, 218 (the var. *lapponicus* only).

Male and Female.—Face yellow, a biarcuate black band (Pl. I, Fig. 1) transversely placed on the ridge above the antennal fossæ, not reaching downward on the fossæ except in rare cases. This band is usually narrow and is sometimes brownish, but it is never dissolved into spots. In the female (Fig. 2) it is usually broader than in the male and may or may not be connected with the black of the vertex at the middle by a narrow band. The cheeks are black and usually connected along the oral margin with the black facial stripe (Fig. 3); there is considerable variation in the oral coloration, it may be merely brownish, as the facial stripe occasionally is, and in a few cases the cheeks and facial stripe are disconnected, this seems especially true of the European specimens in my possession. The eyes of a few of the males show some enlargement of the upper facets, with a distinct line of separation as in *Catabomba*, but usually they intergrade insensibly. The few males from Europe in my collection do not have the enlarged facets separated. The pile of the sides of the thorax is usually yellowish like that of the disk, but it shows some variation in depth of color, depending apparently on age, tenerals being somewhat lighter. Legs dark at the base, exhibiting considerable variation in the extent of the marking, which may range all the way from the extreme base to one half or more of the femora. (This latter condition is the *lapponicus* Zett., in which nearly all of the North American specimens fall.) The abdominal arcuate spots also show much variation in curvature and extent:



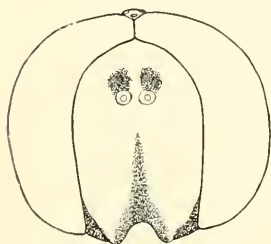
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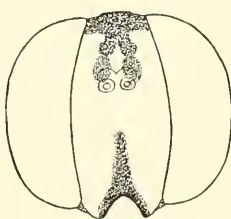
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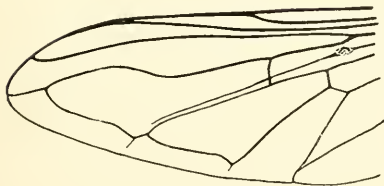
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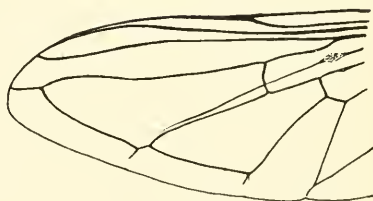
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6



7



8

Syrphidæ.

they are obsolete occasionally in the female (the *S. alcidice* of Walker and the var. *bipunctatus* of Girschner). The third vein of the wing is characteristically much curved above the first posterior cell (Fig. 7) and shows no appreciable variation in this respect. In length the species ranges from 8 mm. to 12 mm.

In North America the species ranges widely over the whole northern half of the continent. I have examined specimens from Connecticut, New Hampshire, New Jersey, District of Columbia, New Mexico, Arizona, Colorado, Idaho, Washington, British Columbia, Alberta and Ontario.

In Europe the color forms, *bipunctatus* Girsch. (= *alcidice* Walk.) and *lapponicus* Zett., are still variously listed as varieties and species, but a recent letter from Dr. Theodore Becker indicates that he regards all three as the same species, "*Syrphus lapponicus* Zett. ist keine besondere Art, vielmehr dasselbe Thier wie *arcuatus*. Diese Art variirt nicht unerheblich: es giebt weibliche Exemplare, bei denen die mondformigen Flecke auf dem hinterleibe fast ganz verschwinden: auch die Schenkel sind an der Basis mehr oder weniger dunkel."

In America Williston confused *arcuatus* with the species here described as new, a point he makes clear in a recent letter: "I had no European specimens at the time I wrote. I would call my 'var. *lapponicus*,' *arcuatus*, of which *lapponicus* is a varietal synonym. Differences in the color of the femora, unassociated with other differences, I will not admit can be of specific value, inasmuch as such differences not infrequently appear in other species."

From my own study of the large series of specimens at my disposal I need only remark that Becker and Williston are entirely correct in these expressions of opinion and that henceforth we have only to deal with one variable species.

***Syrphus perplexus*, new species.** (Pl. I, Figs. 4, 5, 6 and 8.)

WILLISTON, Syn. N. A. Syrph., 68-9 (*Syrphus arcuatus* var. *arcuatus*).

BANKS, Journ. N. Y. Ent. Soc., V, 41 (*S. arcuatus*).

COQUILLET, Proc. Wash. Acad. Sci., II, 431 (*S. arcuatus*).

VERRALL, Br. Flies, VIII, 381 (? *S. arcucinctus*).

OSBURN, Canad. Ent., XXXVI, 218 (*S. arcuatus*).

Male and Female.—Size and general appearance about as in *arcuatus*. Face yellow with black or brown markings as follows: (1) Two rounded spots one above each antennal fossa and running down nearly or quite to the insertion of the antenna (Fig. 4), but showing no tendency toward fusion with the spot of the opposite side. In the female (Fig. 5) the spots may be extended

above, where they may also join with the black of the vertex, but they never fuse on the lower part of the frons. (2) The cheeks are black. (3) There is a facial black or brown stripe extending from the oral margin to below the antennæ. The black of the cheeks and facial stripe is usually well separated by yellow on the oral margin (Fig. 6), but occasional melanistic specimens show a fusion of these spots. The eyes are bare and in the majority of the males the facets show an enlarged area above in such a manner that they are marked off from the smaller ones. The line of separation is not constant in extent, but is usually present on the posterior and lower sides of the area. In some cases the line of demarkation fades out as it runs up the anterior border, sometimes on the lower border, and in some specimens it is wanting entirely so that the facets intergrade insensibly in size throughout.

Thorax metallic blue or bronze, with yellowish pile on the disc, but on the sides with white or grayish-white pile (in one specimen it is somewhat yellowish). Scutellum yellowish with dark reflections, pile yellow intermixed with black on the disc as in *arcuatus*.

Abdomen closely similar to that of *arcuatus*, but the yellow lunate spots on segments 3 and 4 show a general tendency to be narrower and straighter, though these differences are appreciable usually only in series.

Legs as in *arcuatus* and showing about the same range of variation in the extent of black on the femora.

Wings with the third vein nearly straight above the first posterior cell (Fig. 8) and showing no tendency to the formation of a loop. Minor differences also exist in the subapical (upper marginal) and postical (lower marginal) crossveins, which are straighter in this species than in *arcuatus*. These differences are slight but usually perfectly evident (cf. Figs. 7 and 8). Length 9 mm. to 13 mm.

Geographical range as far as known confined to North America where the species is widely distributed. I have examined in all 35 specimens from New Hampshire, Massachusetts, New York, Pennsylvania, New Jersey, Colorado, California, Washington, Alaska, British Columbia, Alberta and Quebec.

Without doubt many of the references to "*S. arcuatus*" in America refer rather to this species or to both, but it is impossible to state with accuracy except in the cases mentioned above. I can be positive in these cases, however, as I have examined specimens of Williston's "var. *arcuatus*," Banks's specimen from Long Island, and those referred to by Coquillett in his Harriman Alaska Expedition paper. In regard to this species Williston states in a recent letter, "I would call my 'var. *arcuatus*' var. *arcuinctus* Walker, supposing that the curvature of the third vein is not specific, and I confess I am troubled about that since I know of no other Syrphid

offering such varietal differences." Verrall (l. c.) also suggests that "Williston's var. *arcuatus* may well be Walker's *S. arcucinctus*." However, Mr. E. E. Austen, of the British Museum, has carefully compared specimens for me with the type of *arcucinctus* and assures me that Walker's *arcucinctus* is none other than *arcuatus*, and that he is unable to identify the present species with any other. The "var. *arcuatus*" of Williston is, then, not Walker's *arcucinctus* (= *arcuatus*), but a different and hitherto undescribed species, as I believe the following characters are fully sufficient to justify:

S. perplexus.

1. Third vein nearly straight, and correlated with minor differences in venation.
2. Pile of the pleuræ white.
3. Two rounded separated spots above the antennæ.
4. The black of the cheeks and facial stripe shows little tendency to fuse.

S. arcuatus.

1. Third vein strongly curved.
2. Pile of the pleuræ yellowish.
3. A single biarcuate black band above the antennæ.
4. The black of the cheeks and facial stripe usually fused on the oral margin, at least in American specimens.

The first and third characters of the above list show no tendency to intergradation, and all four apply equally as well to females as to males.

DESCRIPTION OF PLATE I.

Fig. 1. *S. arcuatus*. Head of male, front view. Note the biarcuate band above the antennal fossæ.

Fig. 2. Do., head of female, a rather melanistic specimen showing the supra-antennal band connected with the black of the vertex.

Fig. 3. Do., side view of head of female.

Fig. 4. *S. perplexus*, head of male, front view. Note the pair of supra-antennal spots extending down to the antennæ.

Fig. 5. *S. perplexus*, head of female, a rather melanistic specimen showing the supra-antennal spots connected with the black of the vertex.

Fig. 6. *S. perplexus*, sideview of head of female.

Fig. 7. Wing of *S. arcuatus*.

Fig. 8. Wing of *S. perplexus*.

STUDIES ON SYRPHIDÆ.—II. THE INVALIDITY OF SCÆVA (=CATABOMBA) AS A GENUS.

BY RAYMOND C. OSBURN,

COLUMBIA UNIVERSITY, NEW YORK CITY.

(WITH PLATE II.)

Among the numerous and more or less unsuccessful efforts to break up the large genus *Syrphus*, is the attempt to remove those species in which the eyes of the males show an area of enlarged facets on the upper portion. The separation of species with this particular character, in correlation with certain others, has been made by three authors in various ways, and each has proposed a new generic name for the group thus removed. Certainly the best known of these names is that of "*Catabomba*," proposed by Osten Sacken* to include *Syrphus pyrastris* Linné, on account of the enlarged facets, swollen frons and small hypopygium. The name was adopted by Williston (though in a recent letter he states that he always had an inclination to reunite the genus with *Syrphus*), and also by Verrall who maintains the validity of the genus.† A number of species have been designated as belonging to "*Catabomba*." Earlier than this was the attempt of Rondani,‡ who gave the name "*Lasiophthicus* (*Lasiophticus*)" to include the species having hairy eyes, naming *S. pyrastris* as the type. This name is used by Aldrich in his Catalog of N. A. Diptera. Still earlier was the revision of the genus *Syrphus* by its author, Fabricius§, with the name "*Scæva*" and *S. pyrastris* designated as the type. This name, apparently, has priority over the others.

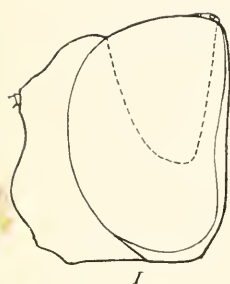
Incidentally, a considerable amount of discussion has arisen as to which of the above authors should have the credit for erecting the genus, and which name should stand. I am satisfied that all discussion of this matter is futile, however, for I have sufficient evidence to prove that such a separation is untenable. No one would consider

* Western Diptera, 1877, 326.

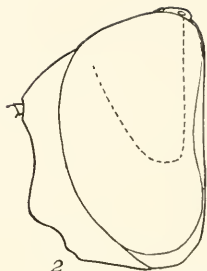
† Br. Flies, Syrphidæ, 333-4.

‡ Nuov. An. Nat. Sci., 1844, 459.

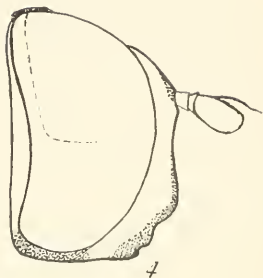
§ Syst. Antl., 1805, 248.



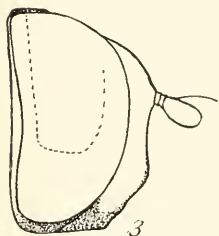
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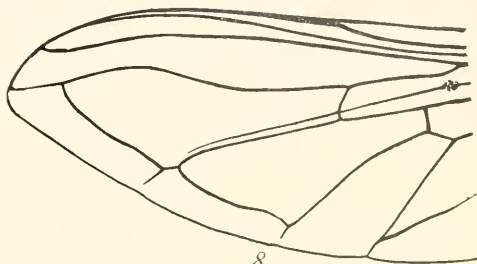
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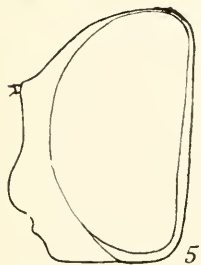
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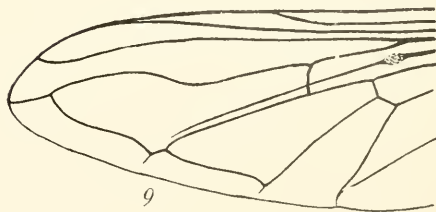
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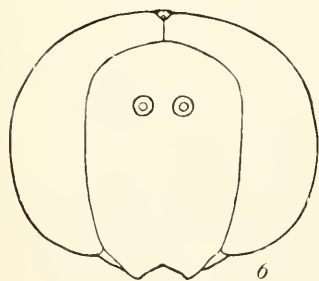
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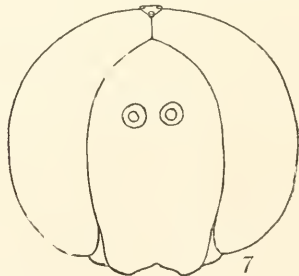
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7

Syrphidæ.

the generic descriptions of "*Scæva*" or "*Lasiophthicus*" except as modified to include the characters outlined by Osten Sacken for "*Catabomba*," viz.: (1) Enlarged eye-facets in the male; (2) swollen frons; (3) small hypopygium, to which may be added the following characters more or less correlated with these; (4) pilose eyes; (5) curved third vein.

The problem resolves itself into this: Are these characters sufficient for the separation of a genus? If they were constant no one would raise an objection, but right here lies the difficulty, for there is not one of them but exists to a greater or less degree in members of the genus *Syrphus*. In a word, "*Scæva*" is based on a specialized condition of certain characters which fade out in the various species of *Syrphus*. Let us examine these characters singly.

1. *Enlarged Facets*.—In all species of *Syrphus* which I have examined (or in all Syrphidæ for that matter), the facets of the upper central part of the eye, in both sexes, are larger than those around the border and upon the lower half of the eye. In most cases there is a regular intergradation in size, but in the males of certain species (*pyrastri* L., *albomaculatus* Macq., *scleniticus* Meig., *melanos-toma* Macq.) there is a sharp line of separation marking off the area of enlarged facets from the smaller ones below, behind and before the area (Pl. II, Fig. 1). This line of demarkation is not always complete (Fig. 2), and Girschner has pointed out* that the amount of separation varies with different species, and has indicated his doubt of the validity of the genus because of this. In this observation Girschner is entirely correct, as I have determined by an examination of *pyrastri*, *albomaculatus* and *scleniticus*, and there is also more or less individual variation in *pyrastri* (my series is not large enough to determine this in the other species). The area is wanting in the females (Fig. 5); so is a secondary sexual character. Moreover, the demarkation of the facets may appear in other species which belong undoubtedly to the genus *Syrphus*. In *S. arcuatus* (Fallén), as I have discovered, this area is of sporadic occurrence, in a few males (Fig. 3), while in a related species, *S. perplexus* Osburn,† the line of demarkation is present to some degree in a majority of the males (Fig. 4), though some do not have it. I have

* Wien. ent. Zeit., III, 197.

† Studies on Syrphidæ, Pt. I, p. 55.

examined thirty males of *arcuatus*, and four of these show this condition. Of *perplexus* I have seen but fourteen males and all but four of these show more or less separation of the facets. Sometimes the line of separation extends nearly around the area (Fig. 3) as it does in *pyrastris*, but more commonly it fades out on the lower border of the area and is confined to the posterior and a part of the lower sides (Fig. 4). Evidently this character, since here it is not even of specific importance, cannot be urged as a generic character.

2. *Swollen Frons*.—This again is most marked in *pyrastris*, where especially in the male, it reaches its highest development (Figs. 1 and 6). In *albomaculatus* it is less marked, while in *scleniticus* (Figs. 2 and 7) it is not more evident than in certain species belonging undoubtedly to *Syrphus* (cf. Fig. 2 with 3 and 4). Verrall[‡] has given it as his opinion that "the inflated frons alone is sufficient to differentiate the genus," but after the examination of three species of "*Catabomba*" and some sixty species of *Syrphus* I am unable to concur in the opinion. The inflation of the frons is so much greater in the male that it may be looked upon as a secondary sexual character (cf. Fig. 1 of *pyrastris*, male, with Fig. 5, female). To my mind there is no more reason for constructing a separate genus on this one character than there would be in the erection of a new genus to include those species, which, like *S. geniculatus* Macquart, have a greater protrusion than usual of the lower part of the face.

3. *Reduced Hypopygium*.—Here again we are dealing with a character that has no special generic significance. It is true that in the "*Catabombas*" the hypopygium is small and almost or entirely concealed from above under the fifth abdominal segment, but it is also true that in *scleniticus* it is much larger than in *pyrastris*, while in a number of species of *Syrphus* (*grossulariæ* Meigen, *auricollis* Meigen, *protritus* O. Sacken, *creper* Snow) it is likewise much reduced and partially or entirely concealed below the fifth segment.

4. *Pilose Eyes*.—Rondani founded his genus *Lasiophthicus* with *pyrastris* as the type, on those species of *Syrphus* which have hairy eyes. The separation on this character is entirely unwarranted in the light of more recent study, as Verrall (l. c.) has pointed out. Verrall further maintains that we may have bare-eyed *Catabombas*, "as I possess four specimens of a bare-eyed species which existed

[‡] Br. Flies, Syrphidæ, 334.

in Bigot's collection under the name of *Syrphus lapponicus* from North America." I believe that these four specimens referred to belong to my *S. perplexus** but cannot be certain without an examination of the specimens. At any rate, the presence of hairy-eyed and bare-eyed species in both "*Catabomba*" and *Syrphus* effectually bars this character from any use in establishing a separate genus.

5. The third vein is curved in the "*Catabombas*" above the first posterior cell (Pl. II, Fig. 8), but again we have species of the genus *Syrphus* (*arcuatus* Fallén (Pl. II, Fig. 9) and *annulipes* Zetterstedt) which are fully as advanced in this respect as any "*Catabomba*," while in "*C.*" *albomaculatus* the vein is but slightly bent. Assuredly we can make no distinction on this basis.

It is evident from the above that we cannot separate a genus "*Scæva*" from *Syrphus* by even one constant character. Neither is there a "distinct facies" presented by a combination of characters of sufficient constancy to serve in the differentiation of such a genus, since the facies is broken into on all sides by related species. The result is that the species *pyrastri* (Linné) with its var. *unicolor* (Curtis), *scleniticus* Meigen, *albomaculatus* Macquart and *melanostoma* Macquart must all be returned to the genus *Syrphus*.

Certain systematists are inclined to view with regret the fact that we have such large genera as *Syrphus*, *Eristalis* and others in which the species may run into the hundreds. Such genera may exist, however, and while the effort to discover absolute differences of more than specific value is certainly laudable, the attempt to found separate genera upon any other than well-marked characters which show no intergradation can only end in greater confusion. The very fact that we have such a large number of closely related species covering a wide range of variability indicates a plasticity of the genus which in itself should cause us to look with suspicion upon new genera separated from the old one. On the other hand, we may determine the existence of groups within the genus which, while not necessarily constant, will serve every purpose for convenience of study without involving the synonymy or suggesting false values in classification.

* Studies on Syrphidæ, Pt. I, p. 55.

EXPLANATION OF PLATE II.

(All the figures drawn under camera lucida.)

Fig. 1. *Syrphus pyrastris* ♂, from a specimen taken by the author at Laggan, Alberta. Note the swollen frons, and the area of large facets, indicated by the dotted line.

Fig. 2. *Syrphus seleniticus*, ♂, a European specimen sent me by Prof. Bezzi.

Fig. 3. *Syrphus arcuatus* ♂, a specimen sent me from British Columbia by Mr. B. G. Elliott. The demarkation of the area of facets is the greatest I have noticed in this species.

Fig. 4. *Syrphus perplexus* ♂, a specimen taken at Searchmont, Ontario, by Mr. E. B. Williamson. The line of demarkation of the area of enlarged facets fades out on the lower border, the usual condition in this species and *arcuatus*, when present at all.

Fig. 5. *Syrphus pyrastris* ♀, a specimen from Seattle, Washington, taken by the author.

Fig. 6. *Syrphus pyrastris* ♂, front view, same specimen as Fig. 1. Note the extreme width of the frons.

Fig. 7. *Syrphus seleniticus* ♂, front view, same specimen as Fig. 2. Note the narrow frons as in other species of *Syrphus*.

Fig. 8. *Syrphus seleniticus*, wing, a specimen sent me by Prof. Bezzi.

Fig. 9. *Syrphus arcuatus*, wing, same specimen as Fig. 3.

STUDIES ON SYRPHIDÆ.—III. AN INTERESTING MERISTIC VARIATION IN SYRPHUS PERPLEXUS.

BY RAYMOND C. OSBURN,

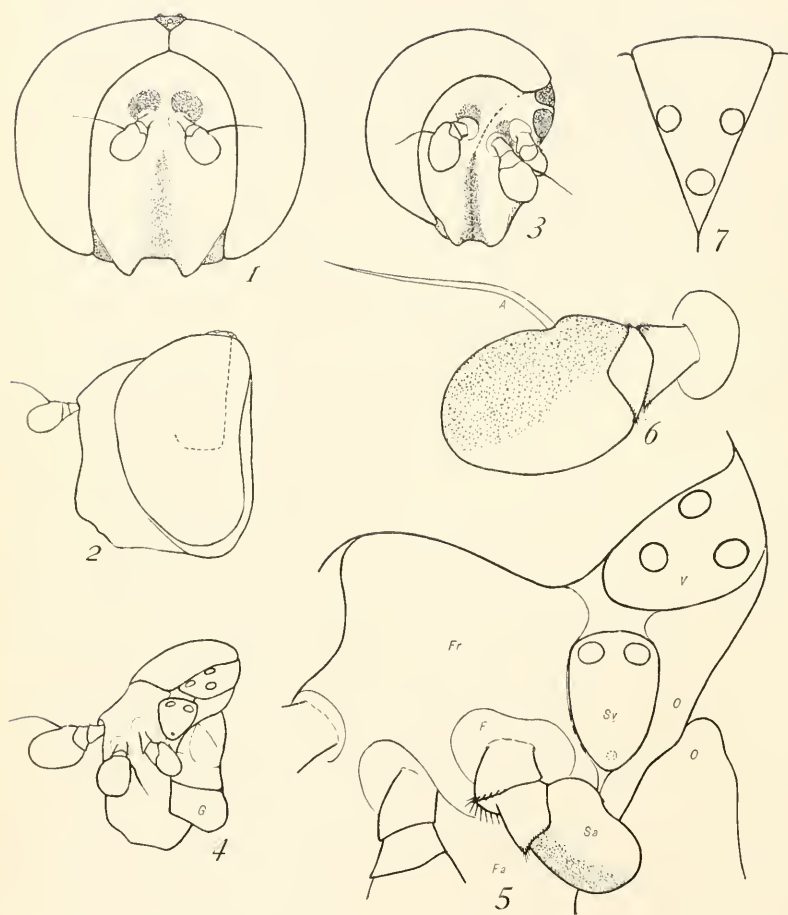
COLUMBIA UNIVERSITY, NEW YORK CITY.

(WITH PLATE III.)

Meristic variations of different sorts have been recorded not infrequently among insects,* but as far as I have been able to discover, none have been noted which involve the entire supression of a compound eye and the presence of a complete supernumerary antenna and vertical triangle with ocelli.

The specimen which exhibits these conditions was sent me by Mr.

* Especially Bateson, Materials for the Study of Variation.



Syrphidæ.

Gustav Chagnon, of Montreal, Canada, who captured it while collecting other Syrphidæ on Montreal Island, Sept. 1, 1907. Mr. Chagnon writes me that he noticed nothing unusual in the actions of the specimen and that it was taken resting on a leaf in the manner characteristic of many syrphids. I have delayed publishing an account of it while working out the synonymy of *Syrphus arcuatus* Fallén and a related new species, *S. perplexus* Osburn, described in the present number of this journal.† This specimen belongs to *S. perplexus*, and is a normal male in all respects except those to be described.

The main features of abnormality are: (1) The total absence of the compound eye of the left side, (2) the presence of a well-developed supernumerary antenna on the left side, (3) a well-developed supernumerary vertical triangle on the left side, (4) the distortion of the head, especially on the left side, due to the suppression of the eye.

The right side of the head is quite normal in the possession of the proper structures, but it is thrown a little out of balance as a result of the absence of the eye of the opposite side. The eyes of the normal male of this, as of other species of *Syrphus*, are extremely large, covering nearly all of the sides of the head. They meet at the top of the head (the condition known as holoptic) for a large part of their width. The vertical triangle is inserted, wedge-like, between the eyes posteriorly (Pl. III, Figs. 1 and 2). The right eye is normal even to the possession of an area enlarged facets, but the absence of the left eye and the consequent lack of development on that side has caused the eye present to appear to extend beyond the middle of the head. This is evidently due to the warping of the morphological median plane of the head (Fig. 3). The face below is nearly normal except that it is slightly depressed, and the antenna of the right side is about in the usual position. The frons is thrown considerably out of the vertical, and the left normal antenna is somewhat lower down than the right one but is normal in structure (Figs. 3 and 4). The color markings of the face, the facial stripe and the supra-antennal spots, are normal except for the twisting (indicated by the dotted line, Figs. 1 and 3) and that the left supra-antennal spot is reduced in size by the encroachment of the additional antenna (Fig. 3).

The supernumerary antenna is situated slightly behind and above

† Studies on Syrphidæ, I, p. 55.

the normal one of the left side. It is located in a separate fossa in all respects like the normal ones, and consists of the usual three joints. The joints are all slightly, but not very materially, different from the normal ones in shape. The third joint lacks the dorsal arista or bristle, but there is present a small tubercle in the position of the arista (Fig. 5), and this I believe is the rudiment of the arista. In the normal antenna of this species the upper and terminal portions of the third joint are pigmented with black, but in the extra antenna the color pattern is reversed, being dark below and yellow above (cf. Figs. 5 and 6). There is no supra-antennal spot such as is seen above the insertion of the normal antenna. The third antenna is also somewhat smaller than the others.

The vertical triangle is in the normal position, but is somewhat misshapen owing to the absence of the compound eye on the left side, which should compress it into a wedge-like form (as in Fig. 7). It possesses the three ocelli of the usual size and nearly normal arrangement (Fig. 5 v). In addition to this there is a supernumerary triangle (Fig. 5, Sv), situated between the normal one and the supernumerary antenna. It bears two well-developed ocelli, the posterior ones a little smaller than usual, but the anterior ocellus is wanting, unless a small prominence near the anterior end of the triangle is to be considered its rudiment. If such is the case, it is entirely devoid of a lens. The position of this triangle is abnormal in that it is out of the median plane of the head and is turned at a wide angle to this plane, pointing downward on the side of the head. It is situated between the frons and the occiput, thus occupying a portion of the space usually filled by the large compound eye. The frons and the occiput do not quite meet around this triangle, and somewhat membranous areas are left above and below it between the frontal and occipital sclerites.

The occiput is greatly distorted on the left side, as a result of the absence of the eye, and it reaches forward on the side of the head to meet the face. It is much wrinkled, and a deep fold runs diagonally downward and forward across it (Figs. 4 and 5).

The gena or cheek, normally, is completely fused with the occiput, while a shallow suture marks it off from the face. In this specimen the facial suture is much exaggerated and the cheek is also marked off above from the occiput by a deep groove. The cheek is also somewhat distorted (Fig. 4, G).

As to what has produced these abnormalities we can only conjecture. The presence of an extra antenna with the suppression of the compound eye naturally recalls the experiments on Crustacea first performed by Herbst* and since repeated by a number of investigators, where by the excision of the compound eye at a certain level an antenna was regenerated instead. This has been found to hold true for a number of crustacea, but the small amount of experimental work bearing on this question in the insects does not seem to bear out this explanation for the specimen at hand. Tornier† has produced forked antennæ in various species of beetles on regeneration, by cutting off the antennal joints at various levels, but his "Hyperantennie" does not mean the presence of supernumerary antennæ. More recently Werber‡ extirpated the compound eye and antenna of *Tenebrio* larvæ and pupæ, and found that in the only two cases which reached maturity, the eye and antenna were regenerated almost normally, so these experiments throw no light on the abnormalities of this specimen. Even if we should accept the supposition that the antenna represents the eye in this case, we should still have to explain the presence of the extra vertical triangle.

At first glance it might seem that the ocelli and triangle are here replacing the compound eye, since they more nearly occupy the position of that organ. It must be recalled, however, that the ocelli are not in any way homologous with the compound eyes, since they are innervated by different nerves arising from different lobes of the brain, and according to the accepted theory of Grenacher§ are only related in their probable development from primitive similar sources. Unfortunately the specimen is dried and therefore not in a condition to investigate as to the internal soft parts. It may be that the condition is due to some injury of such a nature as to completely overthrow the equilibrium of normal development during metamorphosis, and if such is the case, further experimentation on the regeneration

* Herbst, Ueber die Regeneration von antennenähnlichen Organen an Stelle von Augen, Arch. Entw.-Mech., Bd. IX, 1899.

† Tornier, Das Entstehen von Käfermissbildung, besonders Hyperantennie und Hymermelie, Arch. Entw.-Mech., Bd. IX, 1900.

‡ Werber, Regeneration des exstirpierten Fühlers und Auges beim Mehlkäfer, *Tenebrio molitor*, Arch. Entw.-Mech., Bd. XIX, 1905.

§ Grenacher, Untersuchungen über das Sehorgan der Arthropoden, etc., Göttingen, 1879.

of the insect head may throw some light on it. For this reason, and also because it is the only case of the kind that has been noticed I have considered it worth while to describe it in detail.

EXPLANATION OF PLATE III.

(All figures drawn with camera lucida.)

Fig. 1. *Syrphus perplexus*, normal male, front view, stippled areas indicate color markings.

Fig. 2. *Syrphus perplexus*, side view. The dotted line indicates an area of enlarged eye facets.

Fig. 3. *Syrphus perplexus*, abnormal specimen, front view, showing the twisting of the head due to the suppression of the left eye, color markings indicated.

Fig. 4. *Syrphus perplexus*, side view. *G*, gena.

Fig. 5. *Syrphus perplexus*. Superior lateral view, more enlarged. *Fr*, frons; *Fa*, face; *Sa*, supernumerary antenna; *F*, fossa of supernumerary antenna; *V*, vertical triangle; *Sv*, supernumerary vertical triangle; *O*, occiput.

Fig. 6. *Syrphus perplexus*. Normal antenna, enlarged. *A*, arista.

Fig. 7. Normal vertical triangle, enlarged, showing arrangement of ocelli.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF TUESDAY, OCTOBER 19, 1909.

Held at the American Museum of Natural History. President C. A. Leng in the chair, with twenty-six members and eight visitors present.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges:

Memorias de Instituta Oswaldo Cruz, Brazil.

Wiener Entomologische Zeitung, XXVIII, Nos. 7 and 8.

Zeitschrift f. Wissenschaft. Insektenbiologie, V, no. 9.

Canadian Entomologist, XLI, No. 10.

Directions for Collecting and Preserving Insects by Nathan Banks, Bull. 67, U. S. National Museum.

The secretary reported that he had, as authorized at the last meeting, sent a letter to Dr. Bumpus thanking him and the Museum authorities for the ample provision which they had made for the meetings and work of the Society.

The president called upon Dr. Bumpus, who responded in a few words.

Dr. Lutz proposed as an active member Mr. Halsey J. Bagg, 611 W. 152d St., and Mr. Barber proposed Mr. C. V. Blackburn, of Stoneham, Mass.

On motion the by-laws were suspended and the secretary was instructed to cast a single affirmative ballot for the election of these members.

Mr. Davis read the amendments to the by-laws in reference to establishing the office of curator and moved their adoption. The motion was seconded and adopted.

On Mr. Davis' nomination, Dr. F. E. Lutz was appointed curator of the Entomological Collection.

The secretary presented the resignation of Mr. C. H. Sunderland. On request of Mr. Watson this was laid on the table by vote of the Society.

Dr. Zabriskie, in his remarks on *Bruchus discoides*, stated that while collecting in July last summer at Cayuga Lake, N. Y., he swept a great number of these little weevils from golden rod blossoms and also from other flowers, but none was found on wild carrot. He had found the males to be scarce. He pointed out the differences between the antennæ of the two sexes. Various parts of the beetles were mounted on slides and exhibited under the microscope. Dr. Zabriskie explained his method of preparing and mounting this kind of material. He called attention to the apparent absence of coxæ, the peculiarity of the fourth joint of the tarsi, terminal spine on the antennæ, etc. He also exhibited a rare weevil, *Mesites subcylindricus*, the asparagus beetle (*Crioceris 12-punctatus*) and *Hylotrupes bajulus*, the beetle which did so much damage in the woodwork of a house at Moriches, L. I. Dr. Zabriskie also explained his method of making labels for his insect boxes. On question of Mr. Leng, Mr. Schaeffer said he thought Dr. Zabriskie had made a mistake about the absence of the coxæ in *Bruchus discoides*.

Mr. Leng spoke on "Collecting in Northern Georgia," describing the region near Clayton in Rabun County, which he visited in June in company with Mr. Davis, Dr. Love and Mr. Charles Drury, of Cincinnati. Clayton stands at an elevation of 2,000 feet surrounded by a mountainous country with many ridges reaching 3,500 to 3,700 feet. The beetles collected by Mr. Davis were used to illustrate the remarks and exhibited a large percentage of species that would be found in New Jersey. About five per cent. were species known to inhabit the Gulf States; and about the same proportion were species peculiar to or specially abundant in the southern part of the Appalachian Range. Among these were *Cicindela unipunctata*, *Cychnus andrewsi*, *Cychnus bicarinatus*, *Nomaretus debilis*, *Pterostichus grandiceps*, *Dasycerus caroliniensis*, *Corymbites trivittatus*, *Michilysoma heterodoxum* and a new species of *Clerus*, called *jonteli* by Mr. Leng. A complete list of the species obtained will later be published in the Journal.

Mr. Wm. T. Davis exhibited a number of insects collected during the early part of July and described in the notes on "The Camp at Lakehurst, N. J.," published in the September number of the Journal. He also showed a cricket new to New Jersey, collected at Lakehurst on October 3, 1909, and stated that it appeared to be *Cycloptilum squamosum*, described by Scudder from Texas in 1868.

Mr. Joutel exhibited his collection of hybrid moths between male *Cynthia*

and female *Promethea*. He remarked that the full-grown larvæ and moths were different from the normal type of either parent—the female being more nearly normal than the male. The cocoons were also different.

Mr. Joutel also spoke very briefly concerning his investigations on white ants (*Termes flavipes*). Some of the colonies of these insects he had kept and observed for three years, but the conditions were not favorable and he had difficulty in securing the isolation of the colonies without their devouring each other. He had, however, got them to lay eggs and had to a certain extent observed the methods of feeding of the larvæ.

Prof. Wheeler spoke of the delay in the publication of the last number of the Journal and requested that more attention be paid to publishing material on the habits of insects, etc. He asked support for "Psyche," the organ of the Cambridge Entomological Club.

The Society adjourned.

MEETING OF TUESDAY, NOVEMBER 16, 1909.

Held at the American Museum of Natural History. President C. W. Leng in the chair, with twenty-two members and nine visitors present.

The librarian, Mr. Schaeffer, announced the publication of a new general catalogue of the Coleoptera of the world, in which the different families were treated by specialists. It is to be edited by S. Schenkling. He advised its purchase by the Society.

On motion of Mr. Angell the librarian was authorized to purchase the completed catalogue.

The curator, Dr. Lutz, reported that the local collection was being arranged as rapidly as possible by members of the Society, who had been meeting for that purpose at the Museum on alternate Sundays. Much material had also been added to the collection. The method of keeping a record catalogue of the species was explained. Dr. Lutz also stated that the Museum would soon publish a map of the region covered within the fifty mile limit.

Mr. Davis proposed as active members of the Society Mr. Silas Wheat, 987 Sterling Place, Brooklyn, N. Y., and Mr. Ernest Shoemaker, 6916 17th Ave., Brooklyn, N. Y.

Mr. Leng proposed Mr. John D. Sherman, 335 A. Decatur St., Brooklyn, N. Y.

On motion the by-laws were suspended and the secretary was instructed to cast a single ballot for the election of the three proposed members.

The secretary read a letter received from Dr. Bumpus acknowledging the action of the executive committee and assuring the Society of the appreciation by the trustees of the American Museum of Natural History of the important results which the coöperation of the Society promises.

Mr. Leng exhibited a number of old letters, many of them from noted entomologists, which had been turned over to the Society by Mr. Beutenmüller, and remarked that these should be preserved in a suitable way.

Dr. Southwick moved that the President appoint a committee of two to arrange for the care of these letters. The motion was carried and the President appointed Dr. Southwick and Mr. Davis.

Mr. George Frank read an account of "A Collecting Trip to Highland Lake, Sullivan Co., N. Y." He gave an interesting description of the character of the country, which made it an ideal spot for the collector, and mentioned in passing the species of Lepidoptera collected or observed by him on the trip.

Prof. John B. Smith, speaking on "The Geographical Distribution of Insects in New Jersey," remarked that the local map drawn on the black-board was a little too extended, as it took in certain sections not falling within the fifty-mile zone. He exhibited two maps of New Jersey, one a relief map on which he called attention to its chief features and the other showing in color the six faunal regions which he mentioned, namely, the Appalachian, in the extreme northwestern part, along the Delaware River; the Highlands region, just eastward of the former; the Piedmont Plain region, fitting in between the Highlands region and the coast, the region of red sandstone, high, hilly and rolling; the Delaware Valley region, south of the latter and running diagonally across the state, which is the richest entomologically and in which no part of the red shale occurs; the Maritime region, along the coast, and the Pine Barrens, occupying the greater part of southern New Jersey. This region is not so sharply marked as the former, since there are scattered islands of pine barren in the Delaware River region, at Jamesburg and on Staten Island. He referred to the significant fact that in these various faunal regions certain insects differ in the number of broods. Thus the elm-leaf beetle has only one brood in the Piedmont Plain region, while it is two-brooded in the Delaware Valley district. The codling moth is two-brooded in the Delaware Valley and Pine Barren regions, and usually single-brooded in the others, with an occasional fragmentary second brood due to seasonal or local difference. He remarked that no strictly boreal species of insects occurred in the northern highlands of the state, which had an elevation up to 2,000 feet, but in the cold swamps of the pine barrens a few boreal forms had been found. He thought the maps would be helpful as some portion of each one of the faunal regions came within the fifty-mile zone of New York City. Dr. Smith presented the maps to the Society with the prediction that at least 15,000 species of insects would be found to occur within the prescribed limits.

On motion of Dr. Southwick the Society accepted the maps with thanks to Prof. Smith.

Mr. Leng asked if *Trechus chalybaeus*, a boreal species, had not been taken in the cold swamps of the pine barrens. Prof. Smith stated that it had been found near Milltown and South River in the roots of grasses along the water courses.

Mr. Davis referred to a boreal mouse and a boreal snake occurring in the cold swamps of southern New Jersey.

Dr. Alexander Petrunkevitch gave an interesting account of "A Collecting Trip to Southern Mexico," and exhibited a large collection of spiders and insects preserved in alcohol. He spoke briefly on the itinerary of his trip. He sailed from New York early in July and reached Vera Cruz on the ninth, having stopped at Havana *en route*. He also explained his method of packing vials of material between pieces of cardboard to prevent their breaking while on shipment. Two days were spent about Vera Cruz, but as the hills were bare and the vegetation sparse, collecting was poor. Thence he proceeded by railroad to the isthmus of Tehuantepec where he encountered the rich tropical forests of the low-lands of Mexico. Here he stopped ten days at the plantation of Mr. Harvey in the midst of a typical Mexican jungle. It rained a great deal, so that collecting was often done under disadvantages, but he found the fauna extremely rich. He employed various methods of collecting, such as sweeping, digging in bark and leaves and sifting. He mentioned the characteristic kinds of spiders occurring in this region and spoke briefly of their habits. Among those named were the tarantulas, trap-door and jumping spiders, but there was a surprising absence of orb-weaving species, possibly owing to its being the wrong season of the year. From this point he went across the isthmus and a little lower down to a dryer, more gravelly country, with no tropical forests and no jungles—more of a desert in which cactus and mesquite predominated. Here insect life, in spite of the desert-like character of the country, was quite plentiful. Proceeding still further south, he collected a few days near the Guatemalan border, in a low, flat, jungle country, but torrential rains interfered with his operations and ruined the railroad for a considerable distance. Here he took horses to get through the jungle, but everything was so soaking wet that few specimens could be obtained. He mentioned the characteristic insects which he saw at various points on his trip, and remarked that all entomological collecting was merely incidental, as he was primarily after spiders. Among other things he spoke of witnessing the migration of millions of butterflies, the copulation of nymphal locusts, the great number of beautiful *Morphos*, the swarming of the centipedes and scorpions in the thatched roofs, the work of the army-ant (*Eciton*) in clearing these out, the great abundance of mosquitoes, which often pestered him, the almost entire absence of snakes (he having seen only five specimens), the color differences between the jungle and desert forms, etc.

On question of Mr. Leng, Dr. Petrunkevitch described a typical jungle and spoke of its deathly stillness, owing to the absence of life. In closing he stated that arrangements would be made through Dr. Lutz for the members to study and determine the material.

The Society adjourned.

H. G. BARBER,
Secretary.

THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

Members of the Society will please remit their annual dues, payable in January, to the treasurer.

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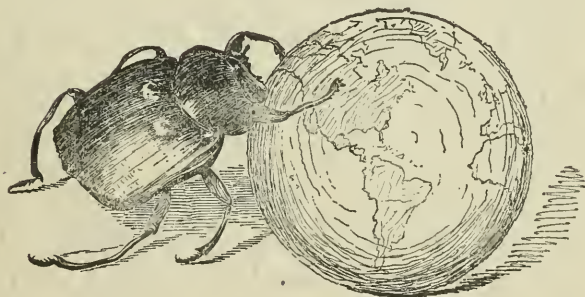
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JOURNAL
OF THE
NEW YORK
Entomological Society.

Devoted to Entomology in General.



JUNE, 1910.

Edited by WILLIAM MORTON WHEELER.

Publication Committee.

E. P. FELT.
E. G. LOVE.

CHARLES SCHAEFFER,
W. M. WHEELER.

Published Quarterly by the Society.

LANCASTER, PA.

NEW YORK CITY.

1910.

[Entered April 21, 1904, at Lancaster, Pa., as second-class matter, under Act of Congress of July, 16, 1894.]

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JOURNAL

OF THE

New York Entomological Society.

Published quarterly by the Society at 41 North Queen St., Lancaster Pa., and New York City. All communications relating to the JOURNAL should be sent to the editor, W. M. Wheeler, Bussey Institution, Forest Hills, Boston, Mass. all subscriptions to the Treasurer, Wm. T. Davis, 46 Stuyvesant Place, New Brighton, Staten Is., New York, and all books and pamphlets to the Librarian, C. Schaeffer, Museum, Eastern Parkway, Brooklyn, N. Y. Terms for subscription, \$2.00 per year, strictly in advance. *Please make all checks, money-orders, or drafts payable to NEW YORK ENTOMOLOGICAL SOCIETY.*

Authors of each contribution to the JOURNAL shall be entitled to 25 separates of such contribution without change of form. If a larger number be desired they will be supplied at cost. provided notice is sent to the Editor before the page proof has been corrected.

JOURNAL

OF THE

New York Entomological Society.

VOL. XVIII.

JUNE, 1910.

No. 2.

NOTES ON COLEOPTERA COLLECTED IN NORTHERN GEORGIA.

By C. W. LENG,

WEST NEW BRIGHTON, STATEN ISLAND, N. Y.

During the last two weeks of June, 1909, William T. Davis, Charles Dury, Dr. E. G. Love and the writer collected the species of Coleoptera named in the following list. Our headquarters were Dozier's Hotel, Clayton, Rabun Co., Ga. Clayton stands at an elevation of 2,000 ft. in a valley traversed by a small river and surrounded by mountains. Our collections were made partly in the immediate vicinity of the village, but principally on either Black Rock or Screamer Mt., each about three miles from the village and each about 3,700 feet high. We also visited the deep forests about Tuckalege Creek, six miles east, and Wilson's Gap, ten miles north. The largest number of *Cychrus* came from the place last named. All these localities are in Rabun County, which is one of the northern tier, and its mountains are quite similar to those of the adjoining states, Tennessee and North Carolina, though they do not reach the elevations attained by the mountains of the latter.

Extreme precipitation, the greatest known in eastern America, manifested during our stay by heavy thunder storms almost every afternoon, combined with the warm climate of its latitude, are factors that influence the flora and fauna of the region. In addition,

important factors for us were the great forests on the mountain sides, unburned and uncut in some places, with many fallen trees and an accumulation of old leaves that, in favorable localities, covered the ground twelve inches deep. In localities that had been burned, the bare ground is so washed by the torrents of rain that it is swept clean of leaves, stones and sticks and the only shelter that remains for ground beetles is under the bark or within the rotten wood of the fallen trees. In the most exposed situations, the slopes are eroded by these rains to a remarkable extent, and the bare red soil, destitute of vegetation, is most discouraging to the collector.

The summit of Black Rock, where we spent much time, is a long ridge, rather than a peak, covered with deciduous forest, with undergrowth of *Rhododendron*, *Asalea*, *Andromeda* and other shrubs growing out of a mass of old leaves dotted with growths of *Galax* vines and brilliantly red *Lychnis*. Hours were pleasantly passed in beating, sweeping and sifting on this summit. At a lower level Chinquapin, the little southern chestnut, was in flower and very productive. From the top of Black Rock, the view to the west and northwest stretches over the valley of the Little Tennessee to countless similar ridges, all forest-clad and gradually increasing in height until the eye rests on the hazy outlines of the Nantahela Mts. of North Carolina. We did not find these ridges favorable ground for *Cychrus*, though by hard work a few were caught. As pointed out by Mr. Davis, they prefer the valleys and ravines in the mountains, where the topographic conditions increase the humidity. Wilson's Gap proved our best hunting ground. There, at an elevation of about 3,000 feet, we found a stream running between two mountains through a ravine with steep sides, opening into a flat which was overflowed in part during heavy rains. The trees were two feet in diameter in many cases and plenty of dead ones lay on the mountain sides. The ground was deeply covered with old leaves and a heavy growth of shrubs edged the stream and hung over its cascades. In the fallen trees, under the loose bark that came off in sheets, burrowing into the rotten wood beneath the bark, were *Cychrus* in plenty, once twelve in one log.

On the map accompanying Dr. Merriam's "Life Zones and Crop Zones" the region we visited appears as the southern extremity of the transition zone. Luxuriant patches of persimmon trees, a small

patch of cane brake near the river, passion flowers in a warm sandy field, yucca in another field were some of the exceptional botanical signs that we were in Georgia; otherwise the trees and shrubs presented a familiar appearance to collectors accustomed to the woods of northern New Jersey. Similarly the subjoined list of beetles contains the names of a few southern species, but many more names of species familiar to northern collectors. It may derive its principal interest from the occurrence of a few species previously known from western North Carolina and the inference that may perhaps fairly be drawn that more thorough collecting in the southern Allegheny Mountains will disclose a greater number of species peculiar to the region.

LIST OF SPECIES AND NOTES.

Species of which I have seen only specimens collected by Mr. Davis are marked Ds. Those based on the collection made by Dr. Love are marked L. Those included on the authority of Mr. Dury were collected and identified by him and are marked Dy. Those not specially marked were either collected by all the party or by me only.

<i>Cicindela unipunctata</i> Fab.	<i>Scarites subterraneus</i> Fab.
6-guttata Fab.	<i>Clivina bipustulata</i> Fab.
patruela Dej.	planicollis Lec.
transversa Leng.	<i>Panagæus fasciatus</i> Say.
tranquebarica Hbst. form minor.	<i>Ardistomis viridis</i> Say (Dy.).
repanda Dej.	<i>Bembidium postremum</i> Say.
12-guttata Dej. (L., Ds.).	lævigatum Say (Dy.).
punctulata Fab.	dilatatum Lec. (Dy.).
<i>Cychrus bicarinatus</i> Lec.	nigrum Say (Dy.).
canadensis Chd.	variegatum Say (Dy.).
andrewsi Harr.	<i>Anillus fortis</i> Horn.
elevatus Fab. (L.).	<i>Tachys nanus</i> Gyll.
<i>Nomaretes debilis</i> Lec.	flavicauda Say.
<i>Carabus sylvosus</i> Say.	granarius Dej. (Dy.).
limbatus Say.	vivax Lec.
serratus Say (L., Ds.).	proximus Say.
<i>Notiophilus æneus</i> Hbst.	<i>Pterostichus mæstus</i> Say.
9-striatus Lec.	honestus Say.
<i>Nebria pallipes</i> Say (L.).	blanchardi Horn.
<i>Pasimachus depressus</i> Fab.	adoxus Say.
substriatus Lec.	spoliatus Newm.

- Pterostichus grandiceps* Chd.
 vinctus Lec.
 lachrymosus Newn. (Dy., Ds.).
 coracinus Newn. (Dy.).
 mutus Say.
Evarthrus sigillatus Say.?
 obsoletus Say (Dy., Ds.).
Amara pennsylvanica Hayw.
 exarata Dej.
Loxandrus velox Dej.
Dicælus dilatatus Say.
 purpuratus Bon. (L.).
 elongatus Bon.
 ambiguus Laf. (Dy., Ds.).
 teter Bon.
 fervus Dej.
 politus Dej.
Badister micans Lec.
Calathus opaculus Lec.
 gregarius Say (Dy.).
Platynus decens Say.
 reflexus Lec.
 extensicollis Say (Dy.).
 ferreus Hald.
Olisthopus parmatum Say.
Atranes pubescens Dej. (Dy.).
Casnonia pennsylvanica Linn.
Galerita janus Fab.
 bicolor Drury.
Lebia ornata Say.
Coptodera ærata Dej.
Cymindis elegans Lec.
 americana Dej.
Apenes lucidula Dej.
Chlænus tomentosus Say (Ds.).
 laticollis Say.
 tricolor Dej. (Dy., Ds.).
Anomoglossus emarginatus Say (Dy.).
Oodes 14-striatus Chd. (Dy.).
Agonoderus infuscatus Dej.
 pallipes Fab.
 testaceus Dej.
Harpalus dichrous Dej.
 pennsylvanicus DeG.
 caliginosus Fab.
 nitidulus Chd.
- Selenophorus ellipticus* Dej.
Stenolophus spretus Dej.
 conjunctus Say (Dy.).
 ochropezus Say (Dy.).
Anisodactylus terminatus Say.
 baltimorensis Say.
 fervus Lec.? (Ds.).
 rusticus Say.
 carbonarius Say (Ds.).
 nigerrimus Dej.
Dineutes vittatus Germ.?
Necrophorus tomentosus Web.
Prinonochæta opaca Say (L.).
Liodes geminata Horn (Ds.).
Agathidium dentigerum Horn.
 oniscoides Beauv.
Conophron sp.?
 longipilosum Casey.
Batrissus monstrosus var. *ferox* Lec.
 denticollis Casey.
Trimiumelba sp.?
Falagria bilobata Say.
 dissecta Er.
Homolota sp.?
Aleochara lata Grav.
Gyrophæna sp.?
Quedius fulgidus Fab.
Creophilus villosus Grav.
Listrotrophus cingulatus Grav.
Staphylinus maculosus Grav.
 comes Lec.
 violaceus Grav.
 viridianus Horn.
Belonuchus formosus Grav.
Philonthus cyanipennis Fab.
Actobius parvus Horn.
Euæsthetus americanus Er.
 lituarium Lec.
 brevipenne Lec.
Lithocaris confluens Say.
Pæderus littorarius Grav.
Sunius prolixus Er.
Stilicopsis paradoxa Sachse.
Palaminus testaceus Er.
Tachinus fimbriatus Grav.
 limbatus Mels.

- Conosoma pubescens* Payk.
 crassum Grav.
 basale Er.
Mycetoporus americanus Er.
Oxyporus stygicus Say.
 5-maculatus Lec.
Apocellus sphæricollis Say.
Bledius cordatus Say.
Erchomus lævis Lec.
Anthobium horni Fauv.?
Scaphidium piceum Mels.
Toxidium 4-guttatum Say.
Megilla maculata DeG.
Hippodamia convergens Guér.
Coccinella 9-notata Hbst.
 sanguinea Linn.
Harmonia picta Rand.
Mysia pullata Say (Ds.).
Psyllobora 20-maculata Say.
Chilocorus bivulnerus Muls.
Brachyacantha congruens Casey (Ds.).
 indubitabilis Cr. (Ds.).
Hyperaspis regalis Casey?
 signata Oliv. (Ds.).
Scymnus sp.
Epilachna borealis Fab. (Ds.).
Aphorista vittata Fab.
Mycetina perpulchra Newn. (Ds.).
Stenotarsus hispidus Hbst. (L.).
Endomychus biguttatus Say.
Languria mozardi Lat.
 gracilis Newn.
Tritoma ruficeps Lec.
 thoracica Say.
Cicones marginalis Mels.
Aulonium tuberculatum Lec.
Philothermus glabriculus Lec.
Clinidium sculptile Newn. (L.).
Silvanus bidentatus Fab.
 advena Waltl.
Læmophlæus biguttatus Say.
Brontes dubius Fab.
Cryptophagus valens Casey.
Mycetophagus pluriguttatus Lec.
Litargus didesmus Say.
Litargus nebulosus Lec.
Anthrenus musæorum Linn.
 varius Fab. (Dy.).
Cryptorhopalum triste Lec.
Orphilus glabratus Fab.
Hister civilis Lec.
Cercus abdominalis Er.
Carpophilus melanopterus Er.
 antiquus Mels.
Colastus unicolor Say.
Conotelus obscurus Er.
Epuræa rufa Say.
 luteola Er.
 helvola Er.
Stelidota 8-maculata Say.
Prometopia 6-maculata Say (Ds.).
Pallodes pallidus Beauv.
Cychramus adustus Er.
Dasycerus caroliniensis Horn.
Trogosita virescens Fab.
Tenebrioides nana Mels.?
 bimaculata Mels.
Thymalus fulgidus Er.
Nosodendron unicolor Say.
Eurypogon niger Mels.
Ptilodactyla serricollis Say.
Ectopria nervosa Mels.
Cyphon obscurus Guér.
Dromæolus striatus Lec. (Ds.).
Adelocera marmorata Fab. (Dy.).
Alaus oculatus Linn.
Hemirhipus fascicularis Fab. (Ds.).
Cardiophorus gagates Er. (L.).
Horistonotus curiatus Say.
Cryptohypnus exiguus Rand.
Anchastus bicarinatus Lec. (Ds.).
Monocrepidius lividus DeG.
 bellus Say (L.).
Elater rubricollis Hbst.
 obliquus Say.
 pedalis Germ. (Ds.).
Megapenthes limbialis Hbst. (Ds.).
Betaron bigeminatus Rand. (L.).
Glyphonyx recticollis Say (Ds.).
Melanotus decumanus Er.

- Melanotus parumpunctatus* Mels.
 americanus Hbst.
Limonijs auripilis Say.
 agonus Say (Ds.).
 nimbatus Say.
 æger Lec.
 griseus Beauv. (Dy.).
Athous acanthus Say (Ds.).
 scapularis Say (L., Dy.).
 cucullatus Say (Ds.).
 sp.? (Dy.).
 fossularis Lec. (Ds.).
Sericosomus silaceus Say.
Oxygonus obesus Say (L.).
Asaphes memnonius Hbst. (Ds.).
 decoloratus Say (Ds.).
Corymbites pyrrhos Hbst. (L.).
 sulcicollis Say (Dy.).
 hamatus Say (Ds.).
 trivittatus Lec. (Ds.).
 divaricatus Lec. (L.).
Melanactes morio Fab.
 reichei Germ.
 procerus Lec. (Ds.).
Dicerca obscura Fab.
 asperata Lap. & Gory (Ds.).
Anthaxia quercata Fab.
Chrysobothris dentipes Germ.
 floricola Gory.
 harrisi Hentz (Ds.).
Agrilus fuscipennis Gory (L.).
 arcuatus Say.
 otiosus Say.
 bilineatus Web. (Ds.).
Brachys aërosa Mels.
Pachyscelus lævigatus Say.
Celetes basalis Lec.
Eros sculptilis Say.
 crenatus Germ. (L.).
Plateros timidus Lec.
 modestus Say.
Calochromus perfacetus Say.
Polyclasis bifaria Say (L.).
Lucidota atra Fab.
Pyropyga nigricans Say.
Pyractomena lucifera Mels. (L.).
Photinus consanguineus Lec.
 pyralis Linn. (Ds.).
 umbratus Lec.? (Ds.).
Photuris pennsylvanicus DeG.
Phengodes laticollis? (Dy.).
Chauliognathus marginatus Fab.
Podabrus rugulosus Lec. (Ds., L.).
 basilaris Say.
 tricastatus Say (Ds.).
 brunnicollis Lec. (Ds.).
Telephorus carolinus Fab.
 scitulus Say?
Tryptherus latipennis Germ.
Malthinus occipitalis Lec. (Ds., L.).
Collops limbellus G. & H.
 4-maculatus Fab. (Ds.).
Anthocomus erichsoni Lec.
Pseudobæus apicalis Say.
Attalus scincetus Say.
 granularis Er.
Melyris cribrata Lec.
Cymatodera bicolor Say.
Clerus jouteli Leng.
 nigripes Say.
 rosmarus Say (L.).
 ichneumoneus Fab. (Ds.).
 lunatus Spin. (Ds.).
Thanoclerus sanguineus Say.
Phyllobæus dislocatus Say (Ds., L.).
Chariessa pilosa Forst. (Ds.).
Cregya oculata Say.
Oligomerus sericans Mels. (L.).
Sitodrepa panicea Linn. (Ds.).
Trichodesma gibbosa Say.
Anobium notatum Say (L.).
Catorama sp.?
Cupes concolor Westw. (L.).
Cis sp.?
Lucanus elaphus Fab. (Ds.).
 dama Thunb.
Dorcus parallelus Say.
Ceruchus piceus Web.
Passalus cornutus Fab.
Canthon chalcites Hald.

- Canthon viridis* Beauv. (L.).
 nigricornis Say.
 lævis Drury (Dy., Ds.).
Chæridium histeroides Web.
 lecontei Harold (Dy.).
Copris carolina Linn. (L., Ds.).
Phanæus carnifex Linn.
 triangularis Say (Ds.).
Onthophagus hecate Panz.
 janus Panz.
 pennsylvanicus Harold.
Atænius imbricatus Mels.
 stercorator Fab.
 abditus Hald.
Aphodius granarius Linn.
 depressus Kng. (Dy.).
 lividus Oliv.
 rubeolus Beauv.
Geotrupes splendidus Fab.
 egeriei Germ. (Ds.).
Trox monachus Hbst. (Ds.).
 sp. (Ds.).
Serica vespertina Gyll.
 sericea Ill. (Ds.).
Macrodactylus angustatus Beauv.
Diplotaxis sordida Say.
 harperi Blanch.
 bidentata Lec.
 liberta Germ. (Ds.).
Lachnosterna villifrons Lec.
 ciliata Lec.
 fraterna Harr.
 hirticula Knoch.
Anomala marginata Fab.
 innuba Fab.
 oblivia Horn.
 undulata Mels.
Pelidnota punctata Linn. (L.).
Ligyris gibbosus DeG.
Aphonus pyriformis Lec.
Dynastes titus Linn. (Ds., L.).
Phileurus truncatus Beauv. (Dy., L.).
Cotinis nitida Linn. (Dy.).
Euphoria sepulchralis Fab.
Cremastochilus harrisi Kirby.
 variolosus Kirby (Ds.).
- Osmoderma scabra* Beauv. (Ds.).
 eremicola Knoch (Dy.).
Trichius piger Fab.
 affinis Gory.
 bibens Fab. (L.).
Valgus squamiger Beauv.
 canaliculatus Fab. (Dy.).
Prionus pocularis Dalm.
Elaphidion villosus Fab.
 mucronatus Fab. (L.).
 cinerascens Lec.
 aculeatus Lec. (L.).
Phyton pallidum Say (Dy.).
Calloides nobilis Say.
Clytanthus ruricola Oliv. (Dy.).
Neoclytus erythrocephalus Fab.
Xylotrechus colonus Fab.
Cyrtophorus verrucosus Oliv.
Eudercus picipes Fab.
Distenia undata Oliv. (Ds.).
Desmocerus palliatus Forst. (Ds.).
Centrodera picta Hald.
Bellamira scalaris Say (Ds.).
Strangalia famelica Newn.
 luteicornis Fab. (Ds.).
Typocerus zebratus Fab.
 lunatus Fab.
 velutinus Oliv.
Acmaeops directa Newn.
Leptura convexa Lec.
 cordifera Oliv. (L.).
 biforis Newn.
 aurata Horn.
 vittata Germ.
 lineola Say.
 vagans Oliv. (Ds.).
Michthysoma heterodoxum Lec.
Cyrtinus pygmaeus Hald.
Monohammus titillator Fab.
Goes tessellata Hald. (L.).
 debilis Lec. (L.).
 oculata Lec.
Cacoplia pullata Hald. (Ds.).
Leptostylus commixtus Hald.
 macula Say.
Liopus variegatus Hald. (Ds.).

- Liopus fascicularis* Harr.
 alpha Say.
Lepturges pictus Lec.
 symmetricus Hald.
 querqi Fitch.
 facetus Say (Ds.).
Urographis fasciatus DeG.
Ecyrus dasycerus Say.
Hippopsis lemniscata Fab. (L.).
Eupogonius tomentosus Hald.
Saperda candida Fab.
 discoidea Fab.
 lateralis Oliv. (Ds.).
Oberea gracilis Fab. (Ds.).
 mandarina Fab. (L.).
 ruficollis Fab.
Amphionycha flammata Newn. (L.).
Anomœa laticlavata Forst. (Ds.).
Coscinoptera dominicana Fab.
Babia 4-guttata Oliv.
Chlamys plicata Fab.
Bassaræus congestus Fab. (L.).
Cryptcephalus quadruplex Newn.
 (Ds.).
 notatus Fab.
 gibbicollis Hald.
 lateritius Newn.
Pachybrachys othonus Say.
Xanthonia 10-notata Say.
 villosula Mels.
Fidia cana Horn. (Ds.).
Graphops pubescens Fab. (Ds., L.).
 curtipennis Mels. (L.).
Chrysochus auratus Fab. (Ds.).
Tymnes tricolor Fab.
 metasternalis Cr.
Paria aterrima Oliv.
 4-notata Say (L.).
Metachroma pallidum Say.
 puncticollæ Lec.
Chrysodina globosa Say.
Nodonota tristis Oliv.
Colaspis favosa Say.
 brunnea Fab. (L.).
 costipennis Dej.
Doryphora 10-lineata Say.
Chrysomela philadelphica Linn.
Lina lapponica Linn. (Ds.).
 scripta Fab. (L.).
Phyllodecta vulgatissima Linn.
Cerotoma trifurcata Forst. (Ds., L.).
Luperus meraca Say (Ds.).
Diabrotica vittata Fab.
 12-punctata Oliv.
Pachyonychus paradoxus Mels.
 (Ds.).
Ædionychis quercata Fab.
 gibbitarsis Say (L.).
Disonycha discoidea Fab. (Ds.).
Lactica tibialis Oliv. (L.).
Crepidodera rufipes Linn.
 helxines Linn. (L.).
Orthaltica copalina Fab. (Ds., L.).
Phyllotreta picta Say.
Blepharida rhois Forst. (Ds.).
Ooontota rubra Web. (Ds.).
Coptocycla aurichalcea Fab. (Ds.).
Spermophagus robiniaë Sch. (Ds., L.).
Polypleurus perforatus Germ.
Nyctobates pennsylvanica DeG.
Scotobates calcarata Fab. (Ds.).
Xylopinus saperdioides Oliv.
 rufipes Say.
Anædus brunneus Ziegl.
Blapstinus mæstus Mels.
Platydema flavipes Fab. (Ds.).
 excavatum Say (L.).
Opatrinus notus Say.
Uloma impressa Mels.
 punctulata Lec. (Ds.).
 imberbis Lec. (Ds.).
Diaperis hydni Fab.
Hypophlæus thoracicus Mels.
Paratenetus punctatus Sal.
Helops americanus Beauv.
 micans Fab. (L.).
 æreus Germ.
 venustus Say (Ds.).
 cisteloides Germ. (Ds.).

- Helops sulcipennis* Lec. (Ds., L.).
Cistela sericea Say.
 pulla Mels.
 oblongata Casey.
 marginata Ziegl. (Dy.).
Hymenorus pilosus Mels. (Ds.).
Isomira 4-striata Coup. (Ds.).
Capnochroa fuliginosa Mels.
Androchirus femoralis Oliv.
Arthromacra ænea Say.
Penthe obliquata Fab.
 pimelia Fab. (L.).
Enchodes sericea Hald. (L.).
Dircæa liturata Lec.
Eustrophus bifasciatus Say (Ds.).
 bicolor Say (Dy.).
Symphora flavicollis Hald. (Ds.).
Mycterus scaber Hald.
Canifa plagiata Mels. (Ds.).
Microtonus sericans Lec.
Oxaxis thoracica Fab.
Anaspis rufa Say (Ds.).
 flavipennis Hald.
Mordella 8-punctata Fab. (L.).
 serval Say (L.).
 marginata Mels.
 lunulata Helm. (Ds.).
 scutellaris Fab.
Mordellistena trifasciata Say.
 semiusta Lec. (Ds.).
 pubescens Fab.
 liturata Mels.
 fuscata Mels. (Ds.).
 discolor Mels. (L.).
Corphyra collaris Say.
Macratia murina Fab.
Notoxus bicolor Say (Ds.).
 monodon Fab. (L.).
Anthicus sturmii Laf.
Pyrochroa flabellata Fab.
Dendroides canadensis Lat. (Ds.).
Macrobasis unicolor Kby. (L.).
Epicauta cinerea Forst. (Ds.).
Eugnamptus angustatus Hbst.
Pterocolus ovatus Fab.
- Attelabus nigripes* Lec.
 bipustulatus Fab.
Tanymecus confertus Gyll. (L.).
Pandeletejus hilaris Hbst.
Aphrastus tæniatus Gyll.
Ithycerus noveboracensis Forst.
Apion sp.
Pissodes strobi Peck.
Hylobius pales Hbst.
 confusus Kby. (Ds.).
Lixus concavus Say (L., Ds.).
 terminalis Lec. (L., Ds.).
 musculus Say (L., Ds.).
 macer Lec. (L., Ds.).
Otidocephalus myrmex Hbst.
 chevrolatii Horn.
Magdalis perforata Horn.
Anthonomus mixtus Lec.
Pseudanthonomus longulus Dietz.
Piazorhinus scutellaris Say.
 pictus Lec.
Gymnetron teter Fab.
Læmosaccus plagiatus Fab. (Ds.).
Conotrachelus juglandis Lec.
 naso Lec.
 anaglypticus Say (Ds.).
 seniculus Lec.
Rhyssomatus lineaticollis Say (L.).
Cryptorhynchus minutissimis Lec.
 ferratus Say.
Piazurus oculatus Say.
Copturus quercus Say.
 binotatus Lec.
Acoptus suturalis Lec. (L.).
Baris striata Say (Ds.).
Centrinus picumnus Hbst.
Plocamus hispidulus Lec. (Dy.).
Balaninus rectus Say.
 nasicus Say.
Eupsalis minuta Drury.
Rhodobænus 13-punctatus Ill.
Dryophthorus corticalis Say.
Cossonus impressifrons Boh. (L.).
Platypus flavicornis Fab.
Pityophthorus sp.?

<i>Xyleborus</i> sp.?	<i>Eusphyrus walshii</i> Lec. (L.).
<i>Chramesus icoriæ</i> Lec. (L.).	<i>Anthribius cornutus</i> Say.
<i>Tropideres bimaculatus</i> Oliv. (Ds., Dy.).	<i>Cratoparis lunatus</i> Fab. (L.).
	<i>Choragus sayi</i> Lec.? (Dy.).

NOTE 1.—*Cicindela unipunctata* was the most abundant and widely distributed tiger beetle. It was found on every mountain; on Brasstown Bald Mr. Dury found it by hundreds. Mr. Davis observed that this species was able to fly, though not for great distances.

NOTE 2.—*Cicindela tranquebarica* varies greatly according to its habitat. In Louisiana and other southern states, as far as I have observed, it is smaller than the northern forms and never metallic or brilliantly colored. The few specimens found in Georgia were of this small dark form, which has been called *minor* by Mr. Edw. D. Harris.

NOTE 3.—*Cychrus bicarinatus* was abundant under the bark of fallen trees and in the rotten wood, occasionally also under stones, logs, etc. Twelve were found in one tree. In a few of the fifty or more examined, three complete carinæ are included in the elytral sculpture; in most there are two complete carinæ as in the type (which came from northern Georgia); in a few specimens, one of the carinæ is broken into oblong tubercles. In all the sides of the elytra are parallel and there is no approach to the more rounded form of *lecontei*, of which this species has been regarded as a variety. *C. bicarinatus*, like others to be mentioned below, occurs in northern Georgia, western North Carolina and eastern Tennessee, or the southern extension of the Allegheny Mountains.

NOTE 4.—*Cychrus andrewsi* occurs in the same region. The specimens we found are identical with those found by Mr. Beutenmuller in the Black Mountains of North Carolina, and differ in many respects from the *Cychrus* found in western Pennsylvania, West Virginia, Ohio and Indiana, which have long been called *andrewsi*, but are identified as *Germari* Chaud. in Roeschke's recent monograph.

NOTE 5.—*Nomarectus debilis* was found at the top of Black Rock Mountain by sifting the deep masses of leaves. It is confined to the region mentioned in note 3.

NOTE 6.—*Anillus fortis*, a very tiny beetle, was also found by sifting on Black Rock Mountain. It occurs in Ohio and Indiana, as well as in these mountains, as I am told by Mr. Dury.

NOTE 7.—*Pterostichus grandiceps* was the most abundant representative of its genus. Like several already mentioned, it is peculiar to the Allegheny Mountains.

NOTE 8.—*Loxandrus velox* was not found in the mountains, but among grass roots near the banks of War Woman Creek. Upon scratching about the short grass, the beetles were dislodged and ran off with a speed that justified their specific name.

NOTE 9.—*Dinucutes vittatus*? differs from the specimens previously known by absence of vittæ and its uniform cupreous color. This was the only water beetle found, although considerable search was made. There are no ponds near Clayton and all the streams flow swiftly.

NOTE 10.—*Liodes geminata* was found by Mr. Davis in a decaying myxomecete. All the specimens comply entirely with the description.

NOTE 11.—*Brachyacantha congruens*. One pair found by Mr. Davis agree perfectly with Major Casey's description of specimens from Asheville, N. C., and indicate that this modification of the *ursina* group may be peculiar to the southern Allegheny mountains.

NOTE 12.—*Carpophilus melanopterus* has been rare in New York collections. We found it in a field overrun with *yucca* by beating the blossoms. Many other beetles occurred with it. All the specimens taken have dark elytra, contrasting strongly with the general pale color.

NOTE 13.—*Dasycerus caroliniensis*, described by Horn from specimens found by Morrison near Morganton, N. C., was found by sifting old leaves at the top of Black Rock Mountain.

NOTE 14.—*Corymbites trivittatus* and *divaricatus* are, like the preceding, peculiar to the region. The female of *trivittatus* is very much larger than the male.

NOTE 15.—*Agrilus fuscipennis*. One specimen of this beautiful insect fell into Dr. Love's umbrella. It is rare and its distribution may not be entirely known, but I believe it is peculiar to the region. Mr. Dury states that it occurs in Tennessee and Kentucky. Rare.

NOTE 16.—*Clerus jouteli*, described in our September, 1909, number, was taken by beating at the top of Screamer Mountain—3,700 feet elevation.

NOTE 17.—*Leptura aurata* is another instance of a species peculiar

to the Allegheny Mountains. We found it on *Rhododendron* flowers. Mr. Dury has it from Virginia, North Carolina and Maryland.

NOTE 18.—*Michthysoma heterodoxum* was found on Black Rock Mountain; first seen at about 3,000 feet elevation and abundant at the top—3,700 feet. As described by Mr. Frederick Blanchard, it is usually found walking up the trunks of oaks, chestnuts and other trees; and from its size, color and form, greatly resembles the large black ant, *Camponotus*. This species again is peculiar to the region previously mentioned.

NOTE 19.—*Cistela marginata*, one specimen taken by Mr. Dury near the top of Screamer Mountain. As remarked by Major Casey (Col. Not., III, p. 166), this species is widely isolated from our other species of *Cistela* and may have to be generically separated. Mr. Dury in a letter adds: "The type is stated to be 12.5 mm. long, this specimen is 14 mm. The elytra are not nearly one half wider than prothorax, as stated in dimensions given for type. The last joint of maxillary palpi does not agree with the form given by Le Conte to separate *Cistela* from the other genera of the family. It must be rare, as I never met with it in Kentucky or Tennessee, nor have I received it in large collections made on Roan Mountain, N. C. Mr. Schwarz says it is found at Washington D. C. It is remarkably active when beaten into umbrella."

MISCELLANEOUS NOTES ON COLLECTING IN GEORGIA.

BY WM. T. DAVIS,

NEW BRIGHTON, STATEN ISLAND, N. Y.

On another page of this Journal Mr. Leng has given an account of our visit to Clayton, Ga., in June, 1909, with particular reference to the Coleoptera collected. Mr. Charles Dury in Entomological News for November, 1909, has also written of the Clayton expedition.

While we were searching for *Cychrus* or capturing tiger-beetles on the steep trail that led up the side of Black Rock Mountain, we

necessarily saw many other insects, and added a goodly number to our collection. Almost the first stone that I turned over sheltered a number of the slow-moving *Stigmatomma pallipes* ants, and in their midst there was a fat and succulent lamellicorn larva about 14 mm. in length. There were a few *pallipes* ants close about it, and attached to the beetle larva there were fifteen ant larvæ in various stages of growth. Most of them were about 5 mm. long, but some measured only about 2 mm. They reminded me of a lot of hungry sucking pigs. I found another lamellicorn larva, evidently of the same species enclosed in its cell under a stone, and the interesting question is, did the workers of *Stigmatomma pallipes* bring the beetle larva to their nest, or did they, after making the discovery, carry their own young or eggs to it. In view of the size of the beetle larva, the latter would seem to be the most probable explanation. Prof. Wheeler states that the larvæ of *Stigmatomma* are not fed by regurgitation, but on pieces of insects, and one of the chief points of interest in this case is the size of the piece.

It is usual to discover paralyzed spiders with the larvæ of *Pompilus* or some allied hymenopterous insects attached to them, but I was surprised upon turning over a stone on the side of Black Rock Mountain to find a large lycosid spider, which was quite active, though it had what was evidently the larva of a hymenopterous parasite firmly attached near the base of its thorax. The spider was so active that it charged and bit at my forceps, and did not seem to be incapacitated in the least by the presence of the larva on its back.

On several occasions when we removed the bark from fallen trees, we discovered a myriopod, evidently belonging to the family Geophilidæ, closely coiled about its eggs, of which there were usually about fifty. We were interested in the fact that the eggs were guarded thus carefully.

The "tumble bug," *Canthon chalcites*, was an amusing insect about Clayton, and we watched many rolling their balls of manure. No doubt the presence of numerous pigs in the mountains contribute much to their support. Often only one beetle rolls the ball, but if there are two, one pushes with its head down and its hind legs on the ball, while the other keeps climbing up on the opposite side of the ball and so pulls it over. The ball is rolled about rather

aimlessly, until a suitable place is reached where it may be buried. One pair that I followed, after doubling on their path, finally concluded to bury the ball in the soft sand surrounding the imprint of a pig's foot into which their treasure had fallen by accident. They however, could have got it out again if they had not been satisfied with the conditions. This pair and their ball was followed by three small flies (*Borborus geniculatus* Macq.), which always kept at a respectful distance until the ball was about to be buried, when they lit upon it, and no doubt profited thereby, for Prof. C. W. Johnson has informed me that the larva of this fly lives in decaying matter.

In this case, also, I noticed an *Onthophagus pennsylvanicus* present, as I did on other occasions about the balls made by *Canthon*.

The balls are often lost by the owners thereof. One I found in a spring on Black Rock Mountain, where we occasionally got a drink. It had rolled down the steep side of a ravine and had no doubt taken the beetles along with it into the water, much to their surprise. They hang closely to their treasure, and on one occasion I saw a ball rolling at great speed down a steep clay bank bearing the beetles along, bumpy-bump, over all obstacles. On another occasion one of the beetles was detached as the ball bounded down a steep incline, and it never found it again but flew away in another direction. This perhaps accounts for some of the cases where I found but one beetle rolling a ball.

Sometimes the balls were lost in the pot-holes in the clay where they were too deep for the beetles to get them out again. On such occasions I sometimes found that the little *Onthophagus* had profited thereby, and had drilled them with its small tunnels, for they were suitably enough located for them.

On our way up the mountain we often saw the showy robber-fly *Laphria saffrana*, and on one occasion I observed another species of robber-fly that had captured a *Cicindela sexguttata* which was quite as bulky as itself. The little *Cicada hieroglyphica* was not uncommon in a certain belt of pines that we passed through, but we found none below or above that level. The natives call the cicadas "jar flies," and the big lumbering *Passalus cornutus* beetle is their "best bug."

Near the top of the mountain there were a few *Lycæna ladon* of large size flying from one to the other of two tall squaw huckle-

berry bushes, and on the top ridge itself I captured one *Nconympha geminata*. It rained so often that butterflies were not at all common.

We had a rival collector in a humming bird that we saw on one occasion fly often out from a tree, remain poised in the air for a time, and then return to its perch. Upon a nearer approach it was discovered that the bird was collecting small insects that were flying before the wind. It was not at all afraid of us, but kept up its entomological pursuits while we stood close by.

Where a number of *Yucca filamentosa* plants had taken possession of a field in the valley, much to the disgust of the owner, we found many of the interesting little moths known as *Pronuba yuccasella*. When we jarred the tall heads of flowers the little moths would fall in numbers into the umbrella along with much water deposited by a passing shower. We became so muddy and bedraggled among these yucca plants that we took to a large brook, shoes, trousers and all, for the purpose of getting somewhat cleaner. That night it was so cold that the warmth of a roaring log fire built in an ample chimney place was most welcome.

On warm evenings we placed our lamps on the piazza and thus collected a considerable number of species. The active bug, *Sirthenea carinata*, was one of those so captured, and we also found it a restful way of collecting after our efforts afield, and our almost daily wetting by the rain.

NEW SPECIES OF NOCTUIDÆ FOR 1910. NO. 1.

BY JOHN B. SMITH, Sc.D.,

NEW BRUNSWICK, N. J.

Noctua corrodera, new species.

Head, thorax and primaries a deep rusty red-brown. Disc of thorax tending to become paler, more yellowish. Primaries with costal area more or less yellowish, veins tending to become blackish outwardly, with accompanying yellowish shadings. Median lines marked by small costal spots only. Ordinary spots indicated by vague yellowish blotches. Median and submedian vein narrowly black marked throughout, the others tending to become so beyond the location of the t. p. line. S.t. line a more or less obvious series of pale interspaceal dots near to and almost parallel with outer margin. A diffuse pale terminal line. Secondaries in the ♂ white, the veins outwardly

marked with dusky: in the ♀ a little yellowish in tinge. Beneath, primaries a little smoky, the margins reddish powdered and with an incomplete extramedian line: secondaries paler or whitish, reddish powdered along costal area, with an incomplete extramedian line.

Expands, 1.28-1.45 inches = 32-36 mm.

Habitat.—Pullman, Washington (Piper); Reno, Nevada; Fort Collins, Colorado, April 12 and July 8 (Doll).

Two males and two females in good or fair condition. The species belongs to the *piscipellis* series; but is brighter in color than any of the described species, with the transverse maculation almost completely wanting. The concolorous front and collar differentiate it from most of the allied forms.

***Aplectoides livalis*, new species.**

Mottled olivaceous gray over a white ground, markings black, clear cut. Head white, front with an incomplete black line, vertex becoming olivaceous. Collar olivaceous to a dusty shading below the white tip. Disc of thorax and patagia mottled, black and white. Abdomen dull gray. Primaries with a rather even olivaceous shading over the white ground, the lines black, included spaces white. Maculation very similar to *speciosa*, but much better defined, more contrasting, without any brown shadings; really more like *pressa* in general appearance and size. A distinct black bar below median vein between the basal and t. a. lines. A black bar, which is probably variable in definition, between the lower portion of the ordinary spots. Orbicular irregular, tending to become incomplete above. Reniform with a black center, smaller and more irregular than in *speciosa*.

Expands, 1.60 inches = 40 mm.

Habitat.—Newfoundland.

This seems to be a good species, although in essentials the maculation is like that of *speciosa*. The latter however is always darker, more obscure and tends to a uniformity of coloring rather than a heightening of the contrasts. The type is a single male in very good condition without date or specific location. I believe it was included among the material received from Mr. Wm. T. Bryant, of Cohasset, Mass.*

* Since the above was prepared Sir George F. Hampson writes: "I have got a very distinct new *Aplectoides* from Newfoundland allied to *speciosa* . . . ; it is much smaller than *speciosa*, black and white with hardly any brown tinge and a very small orbicular which is erect, open above and constricted at middle."

I have little doubt this refers to my species, although my example seems larger and the orbicular is certainly not constricted at middle.

Rhizagrotis actona, new species.

Whitish, more or less powdered with black, so as to give a very light ash gray tint. In the male there is a slight admixture of luteous and the powdering is less dense. Head and thorax concolorous. Primaries with basal and t. a. lines marked on costa only. T. p. line strongly outcurved over cell, then very even, almost parallel with outer margin. It is single, not well defined, best marked on the veins, sometimes tending to punctiform. S. t. line marked by an outward dusky shading, with strong outward dents reaching the margin on veins 3 and 4, and an almost equally strong outward angle touching margin just below apex. Fringes whitish, cut with black opposite the interspaces. Veins narrowly black marked. Claviform a narrow loop extending from base to middle of wing, more or less well defined by black edging, which sometimes appears as a solid line toward base and tends to become lost outwardly. Ordinary spots small, whitish or with a trace of luteous, more or less defined and shaded by black scales. Orbicular narrow, oblique, tending to extend toward and even unite with the small, narrow, somewhat crescent-shaped reniform. Secondaries white, veins outwardly dusky, a venular punctiform extramedian line. Beneath, white in the male; in the female the primaries smoky, both wings with a punctiform outer line.

Expands, 1.30-1.50 inches = 33-37 mm.

Habitat.—Stockton, Utah, IV, VI, VII, IX, Mr. Spalding.

Two males and seven females in good or fair condition. The insect is allied to *albalis* but is less even in color, seems narrower winged, the females are decidedly smaller and darker and the t. p. line is much better defined than in any *albalis* that I have seen. The species are close allies, but look obviously distinct when equal series are associated in the collection.

Peridroma serano, new species.

Head deep smoky brown, palpi black at sides. Collar gray, mottled with brown, with a narrow brown line crossing middle. Thoracic crests marked with gray, else reddish brown. Primaries brown: basal area to t. a. line except within basal line washed with gray; median area a richer, more purplish brown; terminal space darker, smoky brown. Basal line geminate, distinct, brown. T. a. line geminate, brown, very evenly oblique. T. p. line not distinct, defined rather by the contrasts between median and s. t. spaces, evenly sinuate. S. t. line also defined by the darker contrasting terminal area, and a little irregular in course. A series of small black terminal lunules and a narrow pale line at base of fringes. Claviform small, pointed, black. Orbicular large, open to the costa, somewhat V-shaped. Space between it and reniform deep black. Reniform large, open, not defined except by the preceding black spot. Secondaries pale smoky. Beneath, primaries dull smoky brown; secondaries whitish, powdery along the costal area, with a partial extra-median line and a small discal spot.

Expands, 1.60 inches = 40 mm.

Habitat.—Chiricahua Mts., Ariz.

Two females in good condition. The species has the habitus and somewhat the color of a well marked *saucia* with the markings tending to the *c-nigrum* type. It is a very well-marked form and may be described from Mexico, though I cannot identify it with anything in Hampson's work, and saw nothing like it in the Schaus collection.

***Feltia musa*, new species.**

General color a bluish gray over chocolate brown. Head paler red-brown. Collar brown at base, a black median line, then a light gray band below the black tip. Thoracic disc and patagia light gray. Primaries very smoothly clothed, the markings neatly written. Basal line marked only by geminate costal dots very close to base. T. a. line well removed outwardly, single, black, almost upright, outwardly a little bent on costal vein, inwardly more prominently angled on the submedian. The claviform begins at base in the form of two almost contiguous black lines and extends just a little beyond the t. a. line. T. p. line single, crenulate, brown, with a slight outcurve followed by a more feeble incurve. Beyond this line the tint is evenly gray, and there is no trace of a s. t. line. A series of small blackish terminal lunules, followed by a yellow line at base of fringes. In the median space the cell is black or blackish around the small spots, and a dusky shade extends to the costa. Below the cell a faint median shade is traceable through the outer portion. Orbicular small, round or a little extended, sharply defined, concolorous with ground. Reniform narrow, crescent shaped, sharply defined except inferiorly, concolorous with ground. Secondaries evenly smoky in both sexes. Beneath smoky, all wings with a well-marked outer band and discal lunule.

Expands, 1.32-1.48 inches = 33-37 mm.

Habitat.—New Foundland.

One male and one female, both somewhat defective; but fresh and perfect when first papered, so that the colors and maculation are clearly defined. The species is allied to *volubilis*, but differs in the very even coloring, the light gray thorax and the lack of all maculation beyond the t. p. line. There are other details that differ as can be seen by comparing the description. Unfortunately neither specimen has antennæ. I am not sure as to just where these specimens were collected but think it was at Grand Ledge, by Mr. Owen Bryant.

***Porosagrotis catenuloides*, new species.**

This name is proposed for the species that I have everywhere determined as *catenula* Grt., in collections. This species, allied to

the *vetusta* (*muramula*) of the East, is common throughout the Rocky Mountain region and westward, and I found it named *catenula* Grt., in all collections accessible to me over twenty-five years ago—some of the determinations by Mr. Grote himself. I never questioned the species and, in 1900, described as *Carncades contagionis* a species which then came into my hands for the first time. Recently I sent specimens of my species to Sir George F. Hampson and he informs me that *contagionis* is identical with the type of *catenula*. A reference to the original description of that species puts the matter beyond doubt, and *contagionis* must sink as a duplication of *catenula*. But that leaves the species now universally labelled *catenula* in American collections without a name, and for that I propose the term *catenuloides*.

Euxoa andera, new species.

Head gray tending to brown, with a black band across middle of front and another between antennæ. Collar light gray below a broad black median band, darker ash gray above it. Thorax brownish, disc tending to gray. Primaries bluish gray, costal region much paler, through the center a brownish shade which is usually broken in the s. t. space. Transverse maculation lost. A black streak from base below median vein may or may not end in a small, loop-like claviform. The ordinary spots are fused, orbicular elongate, open above to the costa, altogether or in part; reniform small, upright, usu-

ally complete, but sometimes open to costa; inferiorly both spots are sharply defined by the black shade which fills the cell to the median vein. Terminal space dusky, irregular, more or less emphasized by interspaceal blackish streaks. A narrow pale line at base of fringes. Secondaries white in the male, pale smoky in the female.

Expands, 1.12–1.40 inches = 28–35 mm.

Habitat.—Stockton, Utah, September, October (Tom Spalding); Glenwood Springs, Colorado (Barnes); Pullman, Washington (Piper); Readington and Santa Catalina Mts., Pima Co., Arizona, September (Barnes).

A dozen specimens, male and female, are now before me and I have had many more. This is the species that I have had for years as *hollemanni* Grt., and have distributed under that name in all directions. The receipt recently, of a much darker form, with smoky secondaries in the male, almost black in the female, has caused a reëxamination of material and descriptions, resulting in the discovery that this pale form with almost identical markings is really

distinct, and that the true *hollemani* Grt. is a very dark and very rare form.

***Oncocnemis gerdis*, new species.**

Head and lower half of collar chocolate-brown, a narrow black line bordering the dark part of collar. Thorax and primaries bluish gray with black powderings, upper half of collar a little creamy in tinge. Primaries with the markings neat, slender, black. T. a. line single, continuous, a little irregular, but as a whole nearly upright. T. p. line single, continuous, outwardly oblique to vein 6, there forming almost a rectangle, with an inward bend to vein 4, then slightly incurved or nearly upright to the inner margin. There is no s. t. line. Claviform an ovate loop of good size, black ringed, concolorous. Orbicular small, round or nearly so, with a black central dot. Reniform nearly upright, black ringed, of good size, the upper and lower angles touching the t. p. line so that the angle of that line forms a roughly trigonate inclosed area. There is a black streak at base which does not quite reach the t. a. line. A black streak extends from the outer border of orbicular through the reniform, crosses the t. p. line just above the angulation, and extends to the outer margin; but abruptly narrowed just before, the final connection being formed by a narrower streak. Small interspaceal streaks through the terminal area to the outer margin. A black interrupted terminal line. Secondaries white, with a partial series of blackish terminal lunules toward the apex. Beneath white; primaries with the disc powdery and the long discal streaks obscurely reproduced; secondaries blackish powdered along the costal margin only.

Expands, 1.08 inches = 27 mm.

Habitat.—Arizona: Yavapai Co., May 3, Hutson; Baboquivaria Mts., Pima Co.

Two male examples in fair condition. This is a slight species, clearly yet inconspicuously marked, and allied to my *semicollaris* in general habitus.

***Oncocnemis intruda*, new species.**

Head, thorax and primaries bluish gray, with a strigate appearance as a whole. Head tending to creamy white in front, and the collar to the same at extreme base. Collar with a narrow black line below middle, above it a diffuse whitish band and the tip also is whitish. Patagia and thoracic disc strigate with blackish and tending to dusky submargins. Primaries strigate, the ordinary transverse maculation barely traceable. T. a. line marked by a black dot on costa, and below that only vaguely indicated. T. p. line black marked on costa, and again traceable below vein 3, where a few paler scales may emphasize the narrow dusky markings. S. t. line broken, consists of a vague oblique shade inward from apex to vein 6; outwardly a little paler, inwardly a little darker than ground; on veins 3 and 4 obscure outward dents are traceable, and below that point the line becomes conspicuous,

whitish, with a sharp inward tooth opposite the hind angle. There is no obvious claviform. Orbicular consists of a sagittate blackish mark. Reniform a small blackish lunule in a yellowish undefined blotch. A narrow black streak at base; all the veins marked with black or blackish; a series of interspaceal black streaks in the terminal area. Secondaries soiled whitish, all the veins conspicuously smoky; a dusky outer border which, in the female, tends to become rather definite; an obscure discal lunule. Beneath whitish, powdery, with an extra-median dusky line and a small discal spot on all wings.

Expands, 1-1.12 inches = 25-28 mm.

Habitat.—Deming, New Mexico, Sept. 1-7.

One male, one female from Dr. Barnes, the female in good, the male in only fair condition. The female is also the best marked of the two and has served as the base for the description. The species is a chunky one and belongs with *ciliata* in general habitus.

***Oncocnemis sanina*, new species.**

Resembles *levis* in general appearance, but smaller, less definitely marked throughout, the secondaries not so decidedly yellowish in tinge. The collar has a distinct, narrow black cross line; but lacks the double line below the tip. The claviform is less definite, smaller, less acute and does not in any case extend across the median space or touch the t. p. line. The ordinary spots are less well defined and tend to become pale, blotchy in appearance. The interspaceal dark marks before and after the s. t. line are not clear cut but diffuse, and the rayed appearance through the terminal area is not nearly so well marked.

Expands, 1.12-1.20 inches = 28-30 mm.

Habitat.—Gunnison, Colo., July 9.

One male, four females, in fair condition only. Has been associated with *levis* in my collection; but always with a query. The material at hand is now sufficient to convince me that we have a distinct form to deal with.

***Oncocnemis nita*, new species.**

Ground color dull ashen gray over luteous, mottled and powdery. Head and thorax without definite markings. Primaries with all the transverse maculation present, but broken and undefined. Basal line single, black, broken, obscure. T. a. line geminate, blackish, broken, a little irregular and tending to outwardly oblique. T. p. line more obvious, acutely projected over the reniform, very oblique and a little incurved below. The inner edge is marked by black scales, beyond which a rusty yellowish shading merges diffusely into the s. t. space. S. t. line yellowish or whitish, irregular, diffuse, extending to outer margin of veins 3 and 4, preceded by irregular black marks in the interspaces. A series of black terminal lunules. Fringes whitish. Clavi-

form loop-like, incompletely defined by yellowish scales. Orbicular moderate, almost round, whitish ringed, with yellowish filling. Reniform moderate, kidney-shaped, paler than ground, annulate with whitish. Secondaries whitish at base, with a vague outer smoky border and a series of dark terminal lunules. Beneath whitish, primaries outwardly smoky, all wings with an outer line, most distinct on secondaries, a series of terminal lunules and secondaries with a small discal spot.

Expands, 1.20 inches = 30 mm.

Habitat.—San Diego, California, X, 26, XI, 7.

One male, one female, in fair condition, from Mr. George H. Field, received under the number 71, and associated with *O. augustus* which it resembles closely at first sight. It is smaller however, gray instead of brownish, much less distinctly marked, and the course of the t. p. line is quite different, resembling that of *levis* more nearly and lacking the characteristic inward bend of *augustus* on the internal vein.

***Mamestra tenisca*, new species.**

Ground color a smooth reddish fawn. Head and thorax vaguely mottled with darker, brownish shades, collar with a brown transverse line which is never well-marked and tends to become altogether lost. Primaries with median and terminal spaces darker, more distinctly fawn colored; s. t. space with a yellowish tinge beyond the t. p. line tending to a rich, velvety reddish tinge toward the s. t. line. Basal line geminate, oblique, traceable to the submedian vein, slightly angulated on the veins, the defining lines obscure, included space a little pale powdered. The entire line is obscure and not equally marked in any two examples. T. a. line oblique, a little outcurved in the interspaces the inward teeth noticeable on the subcostal and submedian vein. It is geminate, but the inner line is incomplete and the outer scarcely defined against the dark median space, leaving the narrow, whitish included line as the best defining mark. T. p. line similar in make-up, abruptly exerted over the cell, then inwardly oblique, with a very slight incurve, so that the median space on the inner margin is distinctly narrowed; narrower than the basal space and usually no wider than the space beyond it. S. t. line irregular, narrow, pale, rather well defined against the terminal space. An obscure broken terminal line; a distinct yellowish line at base of the long fringes which are cut with yellowish beyond the veins. Claviform small, loop-like, defined by a slightly darker line and sometimes by paler included scales. Orbicular oblique, irregular, usually open to the costa, narrowly outlined in white, concolorous or only a little paler. Reniform small, rather narrow, upright, only a little narrowed at middle, conspicuously white ringed, concolorous or only a little paler in center. Secondaries smoky in both sexes, with pale fringes. Beneath, all wings with a distinct discal mark: primaries

smoky to blackish, secondaries paler, with blackish powderings and a tendency to an extra-median line.

Expands, 1.12-1.20 inches = 28-30 mm.

Habitat.—Stockton, Utah, IX, 5-15 (Spalding); Bozeman, Montana, VIII, 31, IX, 6 (Exper. Sta.).

Four males and two females, all in good condition. The species at first sight resembles *stricta* Wlk., and is probably confused with it in collections. It is, however, decidedly larger, *stricta* averaging less than inch, and is a much more evenly marked and smoother species. In this respect it is nearer to *spiculosa*, which it also resembles more nearly in color and, finally, the narrow whitish outline of orbicular and filling to the ordinary lines is characteristic, if not equally marked in all the specimens.

Mamestra nipana, new species.

Ground color reddish fawn-gray, with darker, smoky brown shadings. Head and thorax a little mottled, but without definite markings or shadings. No obvious dorsal tuftings on abdomen. Primaries without conspicuous markings; the outer part of the median space is, on the whole a little darker, the s. t. space, on the whole a little paler than the rest of the wing. All the lines and markings traceable but none are well defined. Basal line geminate, incomplete, a few black scales usually connecting it with base in the submedian space, and black scales may extend beyond it at this point. T. a. line geminate, outwardly oblique and outcurved between veins, very obscurely defined. T. p. line very even, only a little outcurved over cell, almost evenly oblique below. Median shade a little darker, narrower, parallel and close to t. p. line, crossing and a little darkening the reniform. S. t. line pale, narrow, broken, a little irregular. A series of small black terminal dots followed by a yellowish line at the base of the long concolorous fringes. Claviform small, barely indicated by dark scales in some specimens, altogether lost in others. Orbicular obscure, moderate in size, concolorous, incompletely outlined by darker scales or a paler annulus within its margin. Reniform moderate in size, with a somewhat darker brown border inwardly, and outwardly with two whitish dots at the forking of the submedian vein. Secondaries smoky, with a brown tinge, darkening outwardly to a brown line basing the paler fringes. Beneath reddish gray, powdery, veins with whitish scales; primaries with an obscure discal lunule and an outer line; secondaries more whitish except along costa, with a dusky lunule and incomplete extra-median line.

Expands, .96-1.10 inches = 24-27 mm.

Habitat.—Arizona: Baboquivaria Mts., Pima Co., VII, 15-13, and southern Arizona (Poling), Minnehaha, Yavapai Co., VIII, 11 (Hutson).

Six females, all in good condition. In general pattern and wing-

form resembles *montara*, and there is just a bare possibility that it may be the female of that species. But the ground color is totally different, the relative contrasts are not the same, and the Arizona form gives the impression of a *Tæniocampid*, while the Californian form would be more readily referred to *Perigea*. Besides I do not know of any similar sexual contrasts in this series.

It should be said for both these species that the hairy clothing of the eyes is very short, stiff and, apparently easily broken. A casual examination might, therefore, easily cause an erroneous generic reference.

***Mamestra montara*, new species.**

General ground color creamy gray, powdered with black and smoky brown. Head and thorax without definite markings, the margins of patagia and tips of tuftings somewhat more obviously darkened by the black scales. No distinct dorsal tuftings on abdomen. Primaries with all the normal maculation marked, but incomplete and broken, the most obvious feature being a dusky median shade which is rather evenly outcurved, is nearly parallel to the t. p. line and crosses the reniform. Basal line distinct, rather well defined by blackish shadings, a narrow black streak connecting it with base in the submedian interspace, and an irregular blotch marking the outer edge at the same point. T. a. line geminate, well removed from base, outwardly oblique, a little outcurved in the interspaces, the edges incomplete and not well defined. T. p. line geminate, very even, only a little outcurved over the cell and almost evenly oblique below it: the defining lines not well-marked. Three rather well-marked whitish dots on costa in the s. t. space. S. t. line marked chiefly by the contrasting dark terminal space and by small irregular dusky preceding shades. A series of black terminal lunules, which are preceded by larger lunules of the pale ground, and thus stand out in some relief against the dark terminal area. Claviform small, marked by black scales, not complete in any example. Orbicular round or nearly so, moderate to large size, concolorous, completely defined or only by a small difference in tint. Reniform rather large, ovate, oblique, not constricted, darkened by the median shade, inwardly defined by black scales and a very narrow white line, outwardly with a somewhat well-defined series of white dots, which are narrowly limited by black scales. Secondaries whitish, semi-transparent, becoming dusky toward the outer margin, which is bordered by a blackish line at the base of the white fringes. A small discal lunule, visible from underside. A slight excision on outer margin below apex, not equally marked in all specimens. Beneath whitish, with variable, coarse dark powderings; primaries a little smoky, with a discal lunule and a variably defined exterior line; secondaries with a distinct discal lunule, the powdering most obvious along the costal area.

Expands, 1-1.08 inches = 25-27 mm.

Habitat.—Claremont, California, Mr. Chas. W. Metz.

Seven males, in good to fair condition and, on the whole, very much alike. There is some difference in the amount of powdering and in the relative distinctness of the median shade; but that may be due to some extent to the condition of the specimens; some being evidently more flown than others.

Mamestra gatei, new species.

Dull powdery gray over a luteous ground, without strong contrasts of any kind. Collar with an obscure dark line across the middle. Disc of thorax powdery. Abdomen only a little paler gray, dorsal tuft distinct on basal segment only, second tuft small. Primaries powdery, with all the transverse maculation obscure, broken, the lines marked by geminate black or blackish spots on costa; but only irregularly traceable beyond that point. S. t. line marked by the slightly darker terminal space, deeply bisinuate, sometimes preceded by darker shadings or even sagittate blackish spots in the fifth and sixth interspace. A series of very small black terminal lunules; a yellowish line at base of fringes, which are very narrowly cut with yellowish over the veins. A small black basal streak, scarcely extending beyond the basal line. Claviform large, extending half way across median space, traceably outlined by black scales and sometimes by an obvious black line. Orbicular small, round, black-ringed, with a small central dot. Reniform large, kidney-shaped, a little constricted in center, outlined in black, inferiorly filled with darker, leaden gray; but not contrastingly so. Secondaries white; in the male with a narrow blackish powdered margin, in the female with a broader dusky border; fringes white. Beneath, white, powdery outwardly and along costal region; an extra-median series of venular black dots, and a black discal spot on all wings.

Expands, 1.15-1.30 inches = 29-33 mm.

Habitat.—Fort Wingate, New Mexico, IX, 4-10.

Eight males and five females in good condition. A purchased lot, collector unknown. The antennæ of the males are ciliate merely, the joints very slightly marked. It is an obscure species allied to *Yakima* in wing-form and general appearance; but much darker and unlike any other species known to me. It is somewhat after the *trifolii* type and associated with that series. There is not, however, any definite W-mark in the s. t. line.

Mamestra meodana, new species.

Ground color pale bluish gray, washed with faded reddish fawn. Head varying a little in tint between gray and fawn. Collar inferiorly whitish, a dark line separating the brownish tip. Thoracic disc a little mottled, patagia with a dusky submargin. Dorsal tuftings of abdomen obscure. Primaries with all the maculation distinct, but not contrasting or conspicuously mottled. The median lines are white filled, the defining edges narrow, even and only a

little darker than the ground. Course of lines as in *legitima*. Orbicular with a distinct whitish annulus and a tendency to a gray suffusion; in shape ovate, oblique, tending to become irregularly enlarged costally. Reniform large, imperfectly kidney-shaped, with a very narrow, incomplete white line, and a tendency to a reddish tinge. S. t. line whitish, complete, narrow, forming a W on veins 3 and 4 which extends to the outer margin. Vein 1 is whitish powdered beyond the t. a. line, and vein 2 for its entire length. Other veins tending to become somewhat powdered. Claviform short, pointed, with narrow black margin that tends to become inwardly diffuse, partially darkening the lumen. There is a broken black terminal line, a narrow yellow line at base of fringes, and the latter are narrowly cut with yellow. Secondaries smoky yellowish, with a dusky outer border and paler fringes. Beneath yellowish gray, pale, powdery, with a large discal spot on each wing.

Expands, 1.30-1.50 inches = 32-38 mm.

Habitat.—Calgary, Alberta, VI, 16-VII, 8; Arrowhead Lake, B. C., VII, 8; Pullman, Washington, V, 29, VI, 2; Yellowstone Park, Wyoming, VII, 8-15 Denver, Colorado.

A series of 11 males and 5 females, mostly in good condition. The species has been confused with *liquida* Grt., which is a much more contrastingly mottled form occurring in Washington and probably over a similar range. *Liquida* as described, and as figured by Hampson, has narrower, more pointed primaries and, while the type of maculation is similar, *meodana* is neatly and quietly ornamented, while *liquida* is strongly contrasted and showy.

Scotogramma francisca, new species.

Ground color grayish luteous, scantily powdered with black and ornamented with white. Palpi with blackish hairs at tip, front with a black transverse bar below antennæ, this bar edged with white scales. Collar smooth, with a central black line and a blackish shade below a white tip. Patagia well defined, with a black submarginal line. A central divided crest tipped with white scales. Primaries with all the lines well marked, more or less conspicuously white between narrow broken blackish edgings. Basal line well marked, extending to middle of wing. T. a. line well removed from base, rather evenly oblique, a little irregular in course. T. p. line abruptly bent below costa over cell, then a little denticulate on the veins, evenly oblique to the inner margin rather close to t. a. line. S. t. line whitish, a little irregular, well defined inwardly by the dark s. t. space, outwardly more or less diffuse, a whitish powdering extending into the terminal space and cutting the broad fringes on the veins. A smoky median shade is well marked between the ordinary spots and traceable across the wing. Claviform small, edged with black and centered with white scales. Orbicular small, round or nearly so, with a narrow blackish and an inner whitish ring, center concolorous with ground. Reniform small, oblong, oblique, a little constricted at middle, ringed

with whitish and usually a little paler than ground. Secondaries smoky yellowish at base, with a broad, rather well-defined blackish outer border. Fringes whitish, with a smoky interline. Beneath coarsely powdered; primaries with margins largely smoky, secondaries with a smoky outer border, a vague extra-median line and a small discal spot.

Expands, 1.00-1.06 inches = 25-26 mm.

Habitat.—San Francisco, California, Sept. 21, Oct. 4, Mr. F. X. Williams.

Two males and two females in good condition. The males have the antennal joints a little marked and bristle-tufted and the abdomen at base with loose dorsal tufting.

The species is allied to *stretchii* Hy. Edw., which is referred to *Polia* by Hampson; but for a variety of reasons I prefer to hold our species as at present arranged in my list. The body is plump and the wings are comparatively short and trigonate.

Luperina extensa Sm., Journ. N. Y. Ent. Soc., XIII, 203, 1905, Regina.

Perigea flavistriga Sm., Journ. N. Y. Ent. Soc., XIII, 204, 1905, Lethbridge, Alberta.

The type of the former is a large somewhat defective male with diffuse markings, and the resemblance to *passer* distinctly emphasized. The type of the latter is a very small example in good condition with very narrow, well defined maculation, which gave it a totally different appearance. A small series from Bozeman, Montana, sent in by Prof. Cooley connects the two and proves them identical. The species must stand as *Luperina extensa*.

Copicucullia incresa, new species.

Head, dark grayish brown or blackish. Collar with the upper margin smoky; a distinct black transverse line inferiorly and two cloudy shade-lines more centrally. Disc of thorax deep, blackish-brown, margins of patagia dusky. Abdomen with dorsal tuftings small, dark brown. Primaries ashen gray, with a clean bluish tint in the male, a sordid smoky tint in the female. The transverse maculation is obsolete, the t. a. line barely traceable in some examples; veins narrowly lined with black or shaded with smoky; a dusky shading along the internal margin and a curved dusky streak above the anal angle. A series of terminal interspaceal lunules which tend to unite into a line toward the hind angle. Ordinary spots small, distinct but not conspicuous; orbicular round, annulate with yellowish, with a smoky center; reniform incompletely outlined, broadly kidney-shaped, yellowish and brown powdered. Secondaries in the male pure white with obscure terminal smoky lunules; in the female smoky brown with white fringes, scarcely paler at the base. Beneath, in the male very pale gray, almost white; in the female smoky

brown, more or less powdery, the secondaries more whitish at base and more obviously powdered than the primaries.

Expands, 37-40 mm. = 1.48-1.60 inches.

Habitat.—Claremont, California.

Two males, two females, in good condition from Mr. C. W. Metz, without dates of capture. The species is a very well-marked one in the division with the well-marked ordinary spots and obsolete median lines. The difference between the sexes is very marked and, at first blush, the two do not look at all alike. The male is the smaller with the primaries proportionately narrower and more pointed, while the color is a clean bluish-gray with white secondaries. The female has a sordid smoky and somewhat luteous tinge, and the secondaries are decidedly smoky throughout.

SOME AUSTRALIAN BEES IN THE BERLIN MUSEUM.

BY PROF. T. D. A. COCKERELL,

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About 180 species of Australian bees were described by F. Smith, of the British Museum; I have published about 130 others, and in addition some 35 have been described by various authors. I have in manuscript a complete list, but it evidently represents only a small part of the existing fauna. Every new collection is full of novelties, especially if coming from a little searched locality. The present paper puts on record some species in the Berlin Museum, for the loan of which I am indebted to the kindness of Mr. Embrik Strand.

Palæorhiza perkinsi, new species.

Female.—Length about 9 mm.; head and thorax dark blue, strongly and densely punctured; abdomen with the first segment except the extreme base, the second segment, and the third except the broad apical margin, a very fine deep chestnut red, with a slight purple tint; rest of abdomen very dark blue, becoming black at apex, and with coarse black hair; legs, except trochanters, mainly red, but anterior femora dark bluish, with only the apical part in front red, and tibiae all more or less black on outer side, the hind ones least so; clypeus greenish; face with three longitudinal dull white stripes, one from

the anterior ocellus to the lower margin of the clypeus, and the others, pointed below, along the orbital margins; a whitish stripe also along posterior orbital margins; flagellum brownish beneath; thorax with short white hair, and without light markings; area of metathorax large, triangular, smooth and shining; tegulae dark in front, red behind; wings a little dusky, nervures and stigma black, first r. n. joining second s. m. some distance from its base, and the second, curving inwards, a like distance from its apex; b. n. arched; stigma large. The mandibles have a light spot on upper edge.

Habitat.—North Queensland (*Rolle*). I have not examined the tongue of the unique type (Berlin Museum), but the reference to *Palaeorhiza* is practically certain. The species is dedicated to the describer of the genus. The species has no place in the table of *Prosopis*, owing to the red and blue abdomen.

Euryglossa ephippiata Smith.

Sidney, New South Wales (*Dacmel*).

Euryglossa schomburgki, new species.

Female.—Length 9 mm. or slightly over; robust, head and thorax black, only the front very faintly greenish; abdomen bluish-green, with a sericeous lustre, hind margins of segments dull blackish; legs brownish-black, with glittering pale hair, last two joints of tarsi ferruginous; labrum reddish; mandibles reddish in middle; flagellum entirely bright red beneath, and at apex above; clypeus shining, with scattered large punctures; supraclypeal area smooth in middle; front dull, strongly punctured at sides; mesothorax and scutellum with strong scattered punctures; sides of metathorax with white hair; tegulae rufotestaceous; wings strongly reddened, nervures and stigma clear ferruginous; hind spurs strongly dentate; apical fimbria very pale brownish.

Closely allied to *E. subsericea* Ckll., but much larger and with differently colored wings. The venation is substantially the same, and the facial foveae are linear. From *E. jucunda* Sm. it is known by its larger size and the color of the tarsi; from *E. depressa* Sm. by the color of the antennae, etc.

Habitat.—Adelaide, Australia (*Schomburgk*). Berlin Museum, 22116.

Euryglossa chrysoceras, new species.

Male.—Length about 6 mm.; head and thorax black, the mesothorax and scutellum strongly and closely punctured; abdomen very dark reddish-brown, with the hind margins of the segments very broadly subhyaline yellowish-white, the dorsal segments curving over to the sides of the venter; tibiae and tarsi clear ferruginous, femora suffused with fuscous; mandibles ferruginous, with an inner tooth; scape reddish-brown; flagellum entirely apricot-color,

above and below; tegulæ pale reddish-testaceous; wings clear hyaline; nervures and stigma light yellow; lower section of b. n. strongly arched, falling far short of t. m.; second r. n. joining apical corner of second s. m.

Related to *E. reginæ* Ckll. and *E. adelaidæ* Ckll., but readily known by the color of the flagellum and the broad pallid margins of the abdominal segments. The venation is like that of *E. reginæ*.

Habitat.—Adelaide, Australia (*Schomburgk*).

***Euryglossa sinapipes*, new species.**

Male.—Length about 5.5 mm.; head and thorax black, hairy, with bright mustard-yellow face-marks, tubercles, and a small transverse mark on hind border of scutellum; abdomen warm dark reddish, with thin pale hair, the hind margin of the first segment paler; eyes pea-green; face broad, facial quadrangle about square; mandibles except their ferruginous apices, clypeus except two dots and the narrow dark lower margin, a small supraclypeal mark (broader than long, separated from clypeus by a dark line), lateral face-marks (ending obliquely a little above level of antennæ), and an elongate mark on each cheek beneath, all bright yellow; scape yellow, flagellum light ferruginous (possibly altered by cyanide?); mesothorax dullish, with scattered punctures; anterior legs light yellow, also the middle and hind femora; middle and hind tibiæ and tarsi light reddish, but evidently altered from yellow by cyanide, as on one side the middle leg is all yellow; venter of abdomen dull reddish-orange; tegulæ yellowish-hyaline; wings perfectly clear, iridescent, nervures and stigma light yellow; first r. n. meeting first t. c., second entering apical corner of second s. m.; lower section of b. n. strongly bent, falling far short of t. m.

A curious little species of the group of *E. calliopsiformis* Ckll. and *E. quadrimaculata* Sm., but with the abdomen not spotted.

Habitat.—Adelaide, Australia (*Schomburgk*). Berlin Museum 22119.

***Callomelitta picta perpicta*, new subspecies.**

Male.—Pleura red; abdomen blue (like the typical female); legs wholly black, with light hair. The apical part of the fourth ventral abdominal segment is covered with dense pale yellowish hair; at each side of the base of the fifth is a large tuft of intensely black hair, while the sixth bears a short tooth or spine on each side.

Habitat.—Ararat, Victoria (*Rolle*). Berlin Museum. I possess a cotype of *C. picta* Sm., and have examined Smith's type male, from Tasmania. Smith's figure of the mouth of *C. picta* must have been made for an imperfect preparation; the tongue is broadly emarginate, formed as in *Prosopis*; the paraglossæ are comparatively long, and have (at least in the dry state) a curious appearance, as if jointed,

though there is of course no joint. The labial palpi are more slender than Smith figures, with longer joints; and the blade of maxilla is considerably longer.

Crocisa quadrimaculata Rads.

Herinannsburg, Finke River, S. Australia (*v. Leonhardi*). Allied to *C. lamprosoma*, but very easily separated by the white (not blue) markings, and the arrangement of the pubescence on anterior part of thorax.

Crocisa quartinae Grib.

Mackay, Queensland (*Rolle*); Endeavour River, Queensland (*Rolle*).

Lestis bombylans (Fabr.).

Grampians, Victoria (*Rolle*).

Tetralonia convicta Ckll.

Port Philip (*Coulon*).

Binghamiella antipodes (Smith).

Australia (*Schultz*).

Allodape simillima Smith.

Mackay, Queensland (*Rolle*).

Exoneura bicolor Smith.

Melbourne, Victoria (*Rolle*).

Hyleoides concinnula Cockerell.

Adelaide (*Schomburgk*), one female. From the same locality is a male *H. "zonalis rufocincta,"* as described by me. I am inclined to believe that the male I described as *rufocincta* belongs to *concinnula* and that attributed to *concinnula* to *rufocincta*.

Prosopis lateralis Smith.

Adelaide (*Schomburgk*).

Prosopis penetrata Smith.

Endeavour River, Queensland (*Rolle*).

Prosopis morosa Smith.

Liverpool Plains (*Melly*).

Prosopis elegans Smith.

Adelaide (*Schomburgk*); Adelaide (*Behr*).

Prosopis elongata Smith.

Dandenong Ranges, Victoria (*Rolle*).

Prosopis rufipes Smith.

Australia (*Schultz*). The specimen is a male, this sex being undescribed. It runs to the same place in the table of Australian *Prosopis* as the female, but has the labrum, mandibles, clypeus, a low broad supraclypeal mark, the lateral face-marks, a stripe on scape, upper edge of prothorax narrowly, and tubercles, all cream-color. The second abdominal segment has a large black patch on each side. The lateral face-marks are peculiar, extending very narrowly a long distance up the orbital margin, and having a thorn-like projection opposite the antennæ. The antennæ are not especially long; the flagellum is ferruginous beneath.

Prosopis chrysaspis, new species.

Female.—Length 10.5 mm.; black, with the following parts bright chrome yellow, semilunar lateral face-marks, projecting upper border of prothorax, tubercles, scutellum (except anterior edge, failing in middle, which is black), but not postscutellum; flagellum ferruginous beneath; legs obscurely reddish, anterior tibiæ and tarsi ferruginous on inner side; wings perfectly hyaline, nervures and stigma ferruginous; first r. n. joining first t. c.; second s. m. long; head broad; clypeus strongly and quite densely punctured; mesothorax dullish, with scattered punctures of different sizes; first ventral segment of abdomen obtusely keeled; anterior femora swollen. The lateral face-marks end obtusely above, not on orbital margin, and extend a little above level of antennæ. In my table of Australian *Prosopis* this runs, except for its large size, to the insect labelled *cyanura* in the British Museum, but which has the abdomen black, whereas *cyanura* Kirby is described as having it "atro-cærulescens."

In appearance the new species resembles *P. morosa* Smith, but it is less robust, and differs in the markings of the thorax and face, those of the face especially being wholly different.

Habitat.—Adelaide, Australia (*Schomburgk*). Berlin Museum, 19384.

Prosopis chrysognatha, new species.

Male.—Length about 7.5 mm.; black, with the markings bright chrome-yellow, as follows, transverse spot on labrum, narrow stripe on upper side of each mandible, entire face up to level of antennæ (deeply notched by antennal sockets), tubercles (but no other part of prothorax), scutellum (except anterior and lateral margins), postscutellum, anterior femora beneath (except at base), anterior tibiæ (except a brown band on inner side), middle

tibiæ, and anterior and middle basitarsi; hind legs entirely black, the spurs white; flagellum dull reddish beneath; tegulæ piceous with a small yellow spot; wings very faintly dusky, nervures and stigma dark; first r. n. entering basal corner of second s. m.; mesothorax dullish, rather closely punctured; abdomen strongly and closely punctured.

In the table of *Prosopis* this runs to *P. elongata*, from which it is easily known by the ordinary (not constricted) abdomen, and the markings of the mandibles and legs. The following insect seems to be its female:

Female.—Length 9 mm.; mandibles, labrum, tegulæ and legs without yellow; clypeus black; lateral face-marks semilunar, ending in a moderately acute angle on orbital margin. In the table this runs to *P. simillima* Smith, which has a quite different male.

Habitat.—Type (male) from Melbourne, Victoria (*Rolle*). Female from Australia, Berlin Museum, 1748. Type also in Berlin Museum.

***Prosopis indicator*, new species.**

Male.—Length about 10 mm.; black marked with red and bright chrome yellow; the legs, except the trochanters and the infuscated hind tarsi, wholly bright chestnut red; labrum, mandibles, lower and lateral edges of clypeus, and lower half of cheeks dull red; antennæ red, not very long, flagellum darkened above; clypeus, except the red margins, a narrow triangular supra-clypeal mark, and lateral marks, all bright yellow; the lateral marks end considerably above the level of the antennæ in a rounded lobe, from the orbital side of which comes a linear upward projection, the whole simulating a closed hand, with a short index finger pointed; projecting upper edge of prothorax broadly, tubercles, squarish patch behind, subpyriform patch above tubercles, spot on the ferruginous tegulæ, axillæ, scutellum and postscutellum, all bright yellow; abdomen pointed, the first two segments red, the others black; second segment clouded with blackish; first segment gibbous above, base of second depressed; wings perfectly clear, nervures and stigma dark brown; first r. n. meeting first t. c.; mesothorax dull, with feeble punctures, abdomen roughened, with punctures of different sizes.

Female.—About the same size and general appearance, noticeable for the pointed abdomen; the red is reduced to a chestnut-red suffusion on labrum and mandibles, a dark red suffusion over antennæ, apical half of anterior femora, practically all of middle femora except above, anterior and middle tibiæ in front, anterior tarsi, small joints of middle tarsi, and first two segments of abdomen except the broad black apical margins; the yellow is reduced to broad lateral face-marks (obtuse above, and notched by antennal sockets), tubercles, scutellum except anterior margin, and postscutellum except sides. The front in both sexes is coarsely rugosopunctate.

In the table, the male runs to *P. elegans* Smith, from which it differs by its larger size, the quite different face-marks, the red legs, etc. The female also runs nearest to *elegans*, but differs at once by the black clypeus.

Habitat.—Mallee, Victoria (*Rolle*), one of each sex (the male is the type); Adelaide (*Schomburgk*), one female, No. 19387. All in Berlin Museum.

***Prosopis dromedarius*, new species.**

Male.—Length a little over 8 mm.; black, red and yellow; head and thorax coarsely punctured; face up to level of antennæ entirely bright chrome yellow, the lateral marks extending a little above, ending at an angle of about 45° on orbital margin; labrum largely yellow; mandibles and malar space dark reddish; mouth-parts normal for *Prosopis*; palpal joints with lateral apical points; antennæ long, entirely clear ferruginous, apical joint sulcate above; upper edge of prothorax very narrowly yellow; tubercles and tegulæ red; scutellum and postscutellum each with a transverse orange patch, that on scutellum much the largest, bar-like; punctures of mesothorax and scutellum very strong; legs clear red, the trochanters dark; abdomen roughened, the first two segments red, except hind margin of second, the rest black; first two segments dorsally strongly gibbous, especially the second, presenting two humps in lateral view; wings perfectly clear, stigma and nervures testaceous, first r. n. joining first t. c.

A very distinct and peculiar species, running in the table to *P. elegans*, but differing greatly in many ways.

Habitat.—Adelaide, Australia (*Schomburgk*). Berlin Museum, 19386.

***Prosopis callosa*, new species.**

Male.—Length about 6 mm., rather slender, black with bright chrome-yellow markings; face narrowed below, the long clypeus and adjacent lateral marks entirely yellow, the lateral marks narrow-cuneiform, ending a little above level of clypeus; no supraclypeal mark; mandibles and labrum dark; front rough with minute punctures; scape dark, a little reddish at apex (flagellum lost in type); upper border of prothorax, except in the middle, bright yellow and strongly swollen, this connected with the large yellow tubercles; no other yellow on thorax; mesothorax extremely finely punctured; thorax rather long; wings clear hyaline, iridescent, stigma and nervures rather dark ferruginous; stigma large; basal nervure arched, not reaching transversomedial; first transversocubital wholly absent on both sides; legs very dark brown, anterior tibiæ orange in front; abdomen ordinary, very dark reddish-brown, the sculpture so fine as to be scarcely visible.

Habitat.—Port Philip, Australia (*Coulon*). Berlin Museum,

1750. The name *callosa*, given by some unknown student, is on the label. A remarkable species, with only one submarginal cell. In the table it runs to *P. bituberculata*, from which it differs at once by the structure of the abdomen, etc.

***Prosopis trilobata*, new species.**

Male.—Length about 6 mm.; rather slender; black, with bright yellow markings; face yellow right across, the yellow cut off squarely above a little below level of antennæ, leaving supraclypeal mark about twice as broad as long, and lateral marks broad-cuneiform; below, the lateral marks fail for a short distance, and a little dark process runs between them and the clypeus, while the clypeal yellow also ends, being broadly trilobed; labrum and mandibles dark; mouth-parts normal for *Prosopis*; antennæ rather long, black above, dark reddish beneath; scape with a reddish stripe; front dull, densely rugoso-punctate; projecting upper edge of prothorax, and tubercles, broadly yellow; no other yellow on thorax; mesothorax very minutely punctured; tegulæ piceous; wings dusky, nervures and stigma dark brown, first r. n. entering basal corner of second s. m.; legs black, except the anterior ones in part, as follows: femora rather swollen, with about the apical half behind and less above bright yellow; tibiæ orange in front except apically, and at base behind, otherwise dark red-brown; tarsi obscure reddish; abdomen black, ordinary, very delicately punctured.

Runs in the table to *P. bituberculata*, but very distinct by the ordinary abdomen, etc. The legs, with bright yellow on the first pair only, are very peculiar.

Habitat.—Mallee, Victoria (*Rolle*). Berlin Museum.

***Prosopis rollei*, new species.**

Male.—Length slightly over 6 mm.; rather robust; black, red and orange-yellow; face broad, entirely yellow up to antennæ, and with three equal processes (one median and the others along orbital margins) a short distance above; mandibles and labrum yellow; antennæ bright ferruginous, a little dusky above; thorax robust, mesothorax strongly punctured, with indications of five grooves, counting the short parapsidal ones; upper edge of prothorax rather narrowly, tubercles, tegulæ, most of scutellum and a spot on postscutellum, all ferruginous; base of metathorax with coarse plicæ; head and thorax quite hairy, especially the vertex, sides of metathorax, and pleura; wings perfectly clear; nervures ferruginous; stigma amber-color with a ferruginous margin; first r. n. entering basal corner of second s. m.; legs bright ferruginous suffused with yellow; abdomen short, strongly punctured, black, with the first two segments red except the first broadly and the second more narrowly in the middle, the structure ordinary. A second specimen has the face red except the lower edge of the clypeus, but from the tint this is evidently due to cyanide.

Runs in the table to no group there given, but requires a new subdivision, of species with abdomen largely red, and red on scutellum and postscutellum.

Habitat.—Ararat, Victoria (*Rolle*). 2 males. Berlin Museum.

***Nomia subaustralica*, new species.**

Female.—Length about 11 mm.; black, the abdomen somewhat metallic, with broad pale ochreous hair-bands. This species had been labelled *N. australica* by a distinguished authority, and it does indeed resemble that insect, differing as follows: rather smaller; face rather narrower, and covered with appressed or subappressed pale (dull whitish) hairs; scape red in front, base of flagellum (about two joints) lively red above and below, rest of flagellum black, except a reddish stain at apex; tegulae pale testaceous, the margins whitish; larger punctures of mesothorax even more sparse; mesothorax densely covered in front, behind and more or less at sides with easily deciduous moss-like light fulvous hair, and with no erect black hair; postscutellum covered with fulvous hair, and scutellum ornamented like the mesothorax; tubercles with pale fulvous hair; pleura with quite dense dull white hair; area of metathorax narrower (shorter anteroposteriorly), hardly sculptured; stigma shorter; first r. n. meeting second t. c.; hair on inner side of hind basitarsus white or nearly; abdomen black, the first two segments strongly tinted with green (or purplish on second); bands on first four segments pale ochreous, broad and entire; disc of first segment, before the depression, smooth and shining, with strong scattered punctures; second and third segments similar, with the addition of numerous minute punctures, which on the second are massed anteriorly.

Habitat.—Finke River, Hermannsburg, S. Australia (*v. Leonhardi*); Tennant's Creek, S. Australia (*Rolle*). The latter is the type locality. Two specimens of *N. australica* Smith in the collection are from Melbourne, Victoria (*Rolle*).

***Nomia nana* Smith (*ruficornis* Smith).**

Adelaide (*Schomburgk*). This is the type locality.

***Nomia flavoviridis adelaidella*, new subspecies.**

Male.—Like *N. flavoviridis* Ckll., but a little smaller; flagellum bright ferruginous above and beneath; nervures and stigma clear ferruginous. Abdomen greener than head or thorax.

Female.—Antennæ dark, flagellum ferruginous beneath; nervures and stigma as in male. Abdomen very green. Two other females with the same data have dark nervures like true *flavoviridis*.

Habitat.—Adelaide (*Schomburgk*).

***Nomia hippophila*, new species.**

Male.—Length about 7.5 mm.; dark greenish, with dull white hair; head and thorax very densely and minutely rugoso-punctate, the front and mesothorax dull, the clypeus more shining, its lower margin broadly yellowish-testaceous; face with much white hair, not entirely hiding surface; eyes converging below; mandibles reddish; hair of vertex brownish, contrasting with the white of occiput; antennæ long, flagellum dark brown above, pale reddish-yellow beneath; area of metathorax plicate; tegulæ rather large, shining rufous; wings nearly clear, iridescent, nervures and stigma dull reddish; lower section of b. n. strongly bent; legs red-brown, the femora and tibiæ more or less greenish-metallic; hind femora and tibiæ swollen, but not distorted; abdomen minutely roughened, the depressed posterior portions of the segments (extremely large on 3 and 4) shining; second and following segments with thin white hair-bands, and anterior to these some dark hair, only noticed in lateral view.

Habitat.—Port Philip, Victoria (*Coulon*). Berlin Museum, 2242. Less robust and less metallic than *N. flavoviridis*.

***Nomia victoriae*, new species.**

Female.—Length about 8 mm., robust, black, with a moderate amount of white hair (abundant and glittering on hind legs); abdomen with a little patch of white or yellowish-white hair on each side of first two segments, some fine white hair at extreme base of third (overlapped by second); a broad apical white hair-band, more or less suffused with pale, and slightly interrupted in the middle, on third segment; a broad entire strongly orange band on fourth; and the fifth segment ferruginous, with pale orange hair. Mandibles reddish subapically; tongue dagger-shaped, not very long; face broad, finely sculptured; clypeus rather depressed in the middle, with the subapical region on each side of the middle a little elevated and shining; hair of vertex long and brownish; flagellum obscure ferruginous beneath; mesothorax rather shining, feebly sculptured, and with scattered distinct punctures; mesothorax and scutellum with scattered erect fuscous hairs; area of metathorax plicate; tegulæ quite large, piceous; wings slightly dusky, nervures and stigma fuscous, the latter rather reddish; legs black, hair on inner side of tarsi pale fulvous; hind spurs red-brown. This species is to be compared with *N. gracilipes* Smith, but the abdomen is not blue, although in one specimen the first two segments have a faint greenish tint. The ovate spots of white pubescence found on the hind part of the mesothorax in *gracilipes* are not present in the new species.

Habitat.—Ararat, Victoria (*Rolle*). Two in Berlin Museum.

***Saropoda bombiformis* Smith.**

Australia (*Roth*).

***Anthophora preissi*, new species.**

Female.—Length about 15 mm., very robust, width of abdomen 7 mm. or

slightly more; width of head 5.5 mm.; anterior wing about 11 mm.; black, the hand margins of the abdominal segments broadly but suffusedly coppery-reddish; labrum, base of mandibles and a reversed T on clypeus dull honey-yellow; the last has a narrow stem, rather tapering upwards, while the transverse band is very broad and long, the arms being longer than the stem of the T; flagellum ferruginous beneath; legs obscurely reddish; pubescence short, in the manner of *A. scymna* and *A. æruginosa*, but uniformly mouse-grey, on the vertex and dorsum of thorax rather yellower, and abundantly mixed with black; the abdomen also has many black hairs, which do not obscure the gray color; hair on inner side of hind tibia and basitarsus black, also more or less on inner side of middle legs, but on inner side of anterior tibia the hair is light golden.

Related to *A. scymna* Gribodo, but larger, and quite differently colored. The tegulæ are dark chestnut; in *scymna* they are clear testaceous. The wings are dusky in both species.

Habitat.—Western Australia (*Preiss*). Berlin Museum, 1405.

***Anthophora scymna* Gribodo.**

Adelaide (*Schomburgk*).

***Anthophora æruginosa* Smith.**

Endeavour River, Queensland (*Rolle*).

***Anthophora emendata gilberti* Ckll.**

Mackay, Queensland (*Rolle*).

***Anthophora pulchra* Smith.**

Australia. This specimen, determined by Friese, agrees with a cotype from F. Smith's collection. The abdomen is rather broader than in *A. zonata*, and has rather narrower bands.

***Anthophora zonata subcærulea* Lep.**

Western Australia (*Preiss*); Adelaide (*Behr*); Adelaide (*Schomburgk*).

***Anthophora cingulata* Fabr.**

Adelaide (*Schomburgk*).

***Megachile sequior*, new species.**

Male.—Length nearly 10 mm., with a large broad head and short abdomen; black, with pale ochreous hair, becoming white on ventral surfaces, the abdomen with dense entire apical ochreous hair-bands, the fifth and sixth segments covered with appressed ochreous hair; eyes dark, converging below; face broad, densely covered with pale hair; vertex flattened, densely punctured; cheeks rather narrow; antennæ slender, ordinary, the flagellum dull brown

beneath; mesothorax and scutellum densely rugosopunctate; anterior part of mesothorax with a pair of ill-defined short bands of pubescence probably better defined in fresher specimens; area of metathorax dull, concave in the middle; tegulae clear rufotestaceous; wings slightly dusky, stigma ferruginous, nervures fuscous; legs black with pale hair, anterior tibiae in front and small joints of tarsi, rufescent; anterior tarsi simple; anterior coxae hairy, with short spines; abdomen broadly excavated at base; sixth segment swollen in the middle toward base, its margin truncate, with a rather large rounded black tooth at each corner of the truncation; seventh without spines.

Superficially very like *M. cygnorum* Ckll., but distinguished by the simple anterior tarsi. There is a strong general resemblance to the European *M. apicalis*, but the Australian insect is larger, and the apical structure of the abdomen is different.

Habitat.—Adelaide (*Schomburgk*). Berlin Museum, 20640.

***Megachile semicandens*, new species.**

Male.—Length about 7 mm.; black, with the abdomen beyond the second segment entirely bright apricot color; the second segment has the hind margin red, and three suffused spots, one in the middle, and one on each side, confluent with the red of the margin; antennae long and slender, the flagellum dull reddish beneath; tibiae and tarsi reddish-brown, the anterior tibiae ferruginous in front; head longer than broad, broad-oval; eyes purplish; face densely covered with white hair; hair of head and thorax above thin, dull whitish; cheeks and vertex rather large; tegulae fuscous; wings nearly clear, the stigma and nervures ferruginous; anterior tarsi simple; anterior coxae without spines; sixth abdominal segment vertical, its margin with two widely separated teeth; seventh without spines.

Resembles *M. abdominalis* Smith, but distinguished by the color and structure of the abdomen. There is a strong superficial resemblance to certain forms of *Osmia*, as *O. andrenoides*, but there are no pulvilli.

Habitat.—Adelaide (*Schomburgk*). Berlin Museum, 19407.

***Megachile phenacopyga*, new species.**

Male.—Length 11 mm., the abdomen short; exactly like *M. chrysopyga* Smith, except as follows: face broader, the dense hair covering it pale yellowish, shining white on clypeus; apex of anterior femora and outer side of tibiae not black, but with a little blackish stain; anterior tarsi cream-color, broadly dilated, the first joint fringed on inner side with fuscous hairs, the others with ferruginous, the long white hair of the hind margin tipped with black or fuscous; apical tooth of mandible longer.

Habitat.—Eastern Australia (*Preiss*). Berlin Museum, 1004. Someone had labelled this *M. chrysopyga*, but the real *chrysopyga*

(as described by Smith) is represented by a male from Ararat, Victoria (*Rolle*). In this the second joint of anterior tarsi is produced into a great ferruginous lobe, and the first joint has a smaller apical ferruginous lobe. The other joints are creamy-white. In both species the anterior femora are striped with black on inner side at base, and there is a patch of red hair on anterior coxæ. A female *M. chrysopyga* is from Sydney (*Dämcl*). Another is from Port Philip (*Coulon*). It differs by the pale yellowish (instead of deep ferruginous) hair of the face, and may possibly be the female of *phenacopyga*, though it seems otherwise to be a *chrysopyga*.

***Megachile vestitor*, new species.**

Male.—Length about 14 mm., parallel-sided, black, resembling *M. lucidiventris* Smith in size, form, and the arrangement of the pubescence, but very distinct by the wings, which are clear hyaline except the apical field of the anterior ones, beginning about the end of the first s. m., which is occupied by a rufo-fuscous cloud, dilute below, but dark above, in and beyond the marginal cell; the venation also differs from that of *lucidiventris*, the b. n. falling considerably short of the t. m., and the second s. m. being very much shorter, with the first r. n. joining it as near to the base as the second to the apex; in consequence of the difference in the length of the second s. m., the marginal cell projects much more beyond it than in *lucidiventris*. The abdomen is shining, with strong well separated punctures; in *lucidiventris* it is dullish and very densely rugoso-punctate. Head large, round seen from in front; eyes dark greenish; inner orbits parallel; face densely covered with brownish-white hair; vertex with black hair; flagellum ferruginous beneath; last antennal joint subtruncate, with a shining apical disc; mesothorax strongly and densely punctured, with greyish-white hair mixed with black; hair of scutellum and metathorax dense and greyish-white; tegulæ shining piccous, hairy; legs black with mostly pale hair, anterior femora with long black hair at base, hidden by pale; anterior tibiæ reddish, ferruginous on inner side; anterior tarsi dark brown, but broadly flattened, the first joint with a large shallow canoe-shaped lobe; second and third joints with black spots within; hind margin of tarsi with the usual long fringe, fuscous within; middle tarsi with very long hair posteriorly; abdomen with pale hair on first two segments; following two with short black hair, but some glittering white at extreme sides; fifth and sixth segments with long black hair; venter with white hair; sixth segment strongly longitudinally keeled, the apical margin broadly rounded, with a strong central tooth or spine; no teeth below.

By the structure of the abdomen, this is related to *M. fabricator* Smith, but that species is smaller, and seems to be different, judging from Smith's too short description.

Habitat.—Eastern Australia (*Preiss*). Berlin Museum, 1002.

Megachile nasuta argentifer, new subspecies.

Female.—Length a little over 12 mm., parallel sided, black, with the pale pubescence white, the first two segments of abdomen with white hair (only first in *nasuta*), the others with short black hair; a large round patch of orange-ferruginous hair on the last segment, invading the apical margin of the penultimate one; ventral scopa entirely silvery-white, with a slight creamy tint (pale fulvous in *nasuta*). The great clypeal prominence is as described for *nasuta*, except that its margin is only very feebly crenulate. The eyes are reddish, and diverge below. The wings have the apical field dilute brown.

Habitat.—Melbourne, Victoria (*Rolle*). Berlin Museum. There is a superficial resemblance to *M. heurici* Ckll., especially when the insects are seen from behind.

Megachile preissi, new species.

Female.—Length about 8 mm., evidently very close to *M. clypeata* Smith, but apparently distinct by its larger size, distinctly dusky (though not dark) wings, femora and anterior tibiae ferruginous in front, abdomen very dark reddish, the extremely dense punctures of head and thorax above minute; the abdomen also has very narrow but entire marginal hair-bands. There is short orange-ferruginous hair on the vertical apical segment, also invading the hinder part of the penultimate one. The ventral scopa is entirely white. Eyes brown, slightly converging below; sides of face with spreading white hair, middle with brown hair; clypeus overlapped by long brown hairs, beneath which is white hair; clypeus with a median tooth and a large process on each side; mandibles bidentate, sulcate, reddened subapically, flagellum red beneath; tegulae dark red; second s. m. very long; b. n. falling only a little short of t. m.; hair on inner side of hind tarsi orange-fulvous; base of abdomen broadly excavated, the basin with a distinct rim.

Habitat.—Eastern Australia (*Preiss*). Berlin Museum, 1008.

Megachile adelaidæ, new species.

Female.—Length 10 mm., black, with mostly pale pubescence; a small ordinary-looking species, the specimens not in very good condition, but presenting the following distinctive characters: head large and broad; eyes greyish; front and vertex very densely punctured; mandibles deep red, tridentate; clypeus densely punctured, with more or less of a smooth ridge on its upper part; flagellum bright ferruginous beneath; mesothorax and scutellum extremely densely punctured; mesothorax a pair of small spots of white hair anteriorly; a little patch of white hair above base of wings; metathorax and pleura with much white hair; area of metathorax granular, with a median raised line; tegulae dark reddish; wings clear, a little reddish, nervures and stigma ferruginous; legs dark brown, with pale hair, that on inner side of tarsi yellowish; abdomen cordiform, last segment not vertical, segments with whitish or ochreous bands, not always distinct; sides of apical segments with long black hair; ventral scopa white, black on last segment; hind spurs dark.

Related to *M. macularis* Dalla Torre, but much smaller, and with differently colored mandibles.

Habitat.—Adelaide (*Schomburgk*). 2 females. Berlin Museum, 1940.

***Megachile remotula*, new species.**

Female.—Length 10–11 mm., black with mostly white (not abundant) pubescence, the last two abdominal segments covered except at sides by appressed shining orange-fulvous hair; head large and broad, eyes slightly converging below; face with abundant spreading white hair at sides; on the vertex the hair is fuscous, and fuscous hair is mixed with the white on the front, on the clypeus it is white; clypeus densely punctured, its upper part with a median raised line, its lower margin quadridentate, the teeth small, the inner pair only clearly dentiform, while from beneath this edge project short orange hairs; mandibles broad, dark reddish, with three teeth, not counting the inner edge; front very densely punctured; ocelli rather large; flagellum ferruginous beneath; mesothorax and scutellum dull, exceedingly densely punctured, with short hardly noticeable fuscous hair; other parts of thorax with rather long white hair; area of metathorax with a sericeous, rather shining surface; tegulae dark reddish, closely punctured; wings dusky, stigma and nervures dark fuscous; second s. m. long, receiving the recurrent nervures about equally distant from base and apex; b. n. meeting t. m.; legs reddish-black, in parts distinctly reddish; hind spurs peculiar, blunt, with a little apical claw like hook; first abdominal segment with a patch of white hair on each side; segments 2 to 4 with narrow white apical hair-bands; apical segment not far from vertical; ventral scopa entirely white.

M. remotula is related to *M. ferox* Sm., of which only the male is known.

Habitat.—Eastern Australia (*Preiss*). 2 females. Berlin Museum, 1003.

***Megachile trichognatha*, new species.**

Females.—Length about 10 mm., black, rather slender, parallel sided; head oblong, rather longer than broad; eyes greenish, greyish in front; cutting edge of mandibles densely fringed with orange-fulvous hair; clypeus transverse, densely punctured, with a small snout-like median apical elevation; sides of face with white hair; flagellum dull ferruginous beneath; cheeks broad, rounded; front, vertex, mesothorax and scutellum densely punctured, but the thorax still shining; a little patch of white hair above base of wings; sides of metathorax with white hair; area dull, the basal half rugose; tegulae piceous; wings a little dusky, nervures and stigma dark fuscous, sometimes ferruginous; b. n. falling a very little short of t. m.; legs black, claws ferruginous; abdomen well punctured, deeply excavated at base, second to fourth segments constricted basally; hind margins of segments one to three with variously

incomplete hair-bands, most noticeable as lateral patches; last segment not far from vertical, but curved outward a little apically; ventral scopa entirely white.

Related to *M. fulvomarginata* Ckll., but smaller, with the cheeks much more densely punctured (more or less grooved), the median process of clypeus larger, and hind spurs yellowish-white.

Male.—Length about 8–8.5 mm.; the white hair of head, thorax, legs and under side of abdomen abundant and quite long; flagellum clear ferruginous beneath; tegulae dark reddish; wings clear, nervures and stigma ferruginous; last two segments of abdomen with pale orange hair, and scattered very long white ones; sixth segment with a broad emargination, the angles bordering the emargination sharp and dentiform, there is also a very small median denticle; no apical ventral teeth.

This may be compared with *M. tomentella* Ckll., but differs by the anterior coxæ having well-developed though short spines, the flagellum red beneath, the ferruginous nervures, etc.

Habitat.—Adelaide (*Schomburgk*). Berlin Museum, 19409. 4 females, 3 males. The species is based on the female; the associated males appear to belong to it. The insect is superficially very similar to *M. preissi*.

***Megachile pictiventris* Smith.**

Mackay, Queensland (*Rolle*).

***Megachile lucidiventris* Smith.**

Liverpool Plains (*Melly*).

***Megachile quinquelineata* Ckll.**

Melbourne, Victoria (*Rolle*); Eastern Australia (*Preiss*).

***Megachile macularis* Dalla Torre.**

Port Phillip (*Coulon*). This is the insect I have always determined as *macularis*, as it agrees with the description. A specimen from F. Smith's collection, obtained at Sydney, is smaller and has white hind spurs. This must be distinct, and not a true representative of the species.

***Megachile latipes* Smith.**

Sydney (*Dämel*); Adelaide (*Behr*).

***Megachile henrici* Ckll.**

Adelaide (*Schomburgk*); Sydney (*Dämel*); eastern Australia (*Preiss*). The females are very variable in size; length 12.5 to 17 mm.

Megachile cygnorum Ckll.

Adelaide (*Schomburgk*); eastern Australia (*Prciss*). One specimen bears a label stating it to be the male of *maculata* Smith (*macularis* D. T.); it is possible that this reference is correct, but the hair of the face is much lighter than "golden yellow," and there are apparently other differences.

NEW SPECIES OF PSAMMOCHARIDÆ.

BY NATHAN BANKS,
EAST FALLS CHURCH, VA.

The generic term, *Psammochares*, was first used by Latreille in his "Precis." As with other genera in this work, no species was mentioned. Its next appearance is in the *Histoire Naturelle*, Vol. III., 1802, where, under the genus *Pompilus*, Latreille says that he had previously called this genus *Psammochares*, but prefers *Pompilus*, since it is "*plus douce des oreilles*." A species is given, so that *Psammochares* must date from 1802; others there are who would date in from the "Precis," 1796. In Latreille's later works *Psammochares* appears as a synonym of *Pompilus*, but it appears to have escaped most of the cataloguers. *Pompilus* is unfortunately preoccupied, so that *Psammochares* will replace it. Mr. Fox has suggested *Anoplius*, 1830, to replace *Pompilus*, overlooking *Psammochares*. Mr. Fox has suggested also that the family be called Ceropalidæ; but *Ceropales* was proposed in the same work as *Psammochares*, and on a later page; moreover, some writers consider the Ceropalidæ as a family just for the genus *Ceropales*; therefore I shall employ Psammocharidæ.

***Psammochares albomarginatus*, new species.**

Male.—Black, with dense silvery pubescence, especially on face, prothorax, pleura, coxæ and posterior metathorax. Clypeus broad, truncate in front; a faint line from antennæ to ocelli; anterior ocellus fully its diameter from laterals; vertex nearly straight across; antennæ short and thick; head white-haired behind and silvery; pronotum angulate behind, posterior margin distinctly white; metathorax short and sloping, with a median groove; abdomen slender, subcylindrical, apical segment depressed, and gray-haired above,

penultimate and preceding segment below with a few long hairs near apical margin, but no brush. Wings rather smoky, broadly darker on tip, marginal cell short, second submarginal narrowed above, third petiolate or almost so, receiving the second recurrent vein beyond middle, this vein barely bent, and arising slightly before middle of anal cell; veins not reaching apical margin. Legs slender, distinctly spined, a few on hind femora above before tip; longer spur of hind tibiæ fully two thirds length of metatarsus. Length, 10 mm.

From Falls Church, Va., May to July. Resembles *P. virginicus*, but has white margin to pronotum.

***Psammochares angularis*, new species.**

Male.—Small, black, face below the antennæ rather grayish; clypeus broad, short, convex in front; antennæ rather short, eyes approaching above, but inner orbits are barely concave; anterior ocellus about its diameter from smaller laterals, these as near to the eyes as to each other; vertex nearly straight across; pronotum short, angulate behind, metathorax only slightly and evenly convex, a distinct median groove; abdomen narrow, cylindrical, last segment dull; legs short, femora rather heavy and tibiæ quite broad at tips; spines very small and short; longer spur of hind tibiæ hardly two thirds the length of metatarsus; wings black, darker on tip; marginal cell very short, second submarginal cell almost triangular, being narrowed nearly to a point above, receiving the first recurrent beyond middle; third submarginal triangular, almost petiolate; the second recurrent arising scarcely one fourth way out on anal cell, and meeting the third submarginal before middle; the second discoidal cell is, therefore, extremely short, in fact much broader than long; basal veins interstitial in fore wings, dislocated in hind wings. Length, 6.5 mm.

From Claremont, Cal. (Baker). Related to *P. cylindricus*, but readily separated by shape of the second submarginal and second discoidal cells, and by shorter spurs of hind tibiæ.

***Psammochares arizonica*, new species.**

Black, abdomen red; all clothed with dense silvery pile. Clypeus broad, truncate or almost emarginate in front, margined; no line from antennæ to ocelli; antennæ short, fully as long as width of vertex; vertex straight across; inner orbits slightly concave above; face with long black hairs, and dense silvery pile, almost forming a spot on middle of clypeus; pronotum short, arcuate behind, posterior margin and across middle silvery, connected on middle, leaving only a slender triangle of black each side; mesothorax silvery in front of, and each side of scutellum; metathorax silvery, leaving only a large black spot each side near base, a median groove. Abdomen reddish above and below, with black hair near tip, abdomen rather broad, and somewhat depressed; coxæ and legs silvery on the tibiæ, leaving black stripes, anterior tarsi strongly ciliate; longer spur of hind tibiæ rather more than one

half the length of metatarsus; legs strongly spined. Wings fuscous, rather paler in some of the cells, marginal cell not very long, acute at tip, second submarginal longer than broad, receiving the first recurrent at tip; third submarginal almost triangular, nearly as long as second, receiving the second recurrent a little before middle, this vein curved outward, and arising beyond middle of anal cell; in hind wings the basal veins are interstitial, as in the fore wings. Length, 17 mm.

From Palmerlee, Arizona, May (Biederman).

***Psammochares biedermani*, new species.**

Male.—Black, with sericeous pubescence, almost all over, except on the tibiae and tarsi, very dense on the metathorax; last segment of abdomen white above, the genitalia jet black on tip. Clypeus rounded in front, a line from the antennae to ocelli; anterior ocellus nearly twice its diameter from the laterals; antennae moderately slender; vertex slightly rounded; anterior orbits but little concave; pronotum short, posterior margin angulate, constricted; metathorax short, evenly rounded; abdomen elongate, fusiform. Legs slender, first pair small, coxae I not reaching more than two thirds way to coxae II, mesosternum emarginate in middle behind; femur I slender; all tibiae with very short spines; longer spur on hind tibiae but little more than one half the length of metatarsus; all tarsi very long; last joint of hind tarsi without spines beneath. Wings hyaline, apex fumose; basal veins interstitial, marginal cell long, acute, second submarginal longer than broad, receiving the first recurrent much before the tip; third submarginal shorter than the second, narrowed above, second recurrent arising much beyond middle of the anal cell, running nearly straight up to the middle of the third submarginal; stigma black; basal veins of hind wings almost interstitial. Length, 8 mm.

From Palmerlee, Arizona, July (Biederman).

***Psammochares birkmanni*, new species.**

Male.—Black, with silvery pubescence. Clypeus rounded in front, vertex slightly convex, a faint line from ocelli to antennae, antennae thick and stout, not reaching to end of thorax, few hairs on head and thorax, except fine pubescence; pronotum silvery, with a median line, posterior border arcuate, pleura and coxae silvery; metathorax sloping, broad, silvery; abdomen short, silvery pubescence on apex of segments and on the sides; legs slender, almost devoid of spines, or only very small ones on tibiae; longer spur of hind tibia nearly as long as metatarsus. Wings hyaline, tip slightly infuscated; marginal cell acute; second submarginal a little narrowed above, receiving the first recurrent vein before tip; third submarginal a little larger than second, slightly narrowed above; the second recurrent vein arising beyond the middle of anal cell, bending a little outward at middle, and meeting the third submarginal beyond middle; the veins extend out to the apical margin of wing. Length, 5 mm.

From Fedor, Lee Co., Texas, Sept. (Birkmann).

In general appearance much like *P. argenteus*, but differs in shape of third submarginal cell, in veins running to margin of wings, smaller spines on legs, etc.

***Psammochares californica*, new species.**

Male.—Black, head with much long black hair, hair on thorax much shorter; hind tibiæ with an elongate white spot above at base, spurs black; wings faintly infusate, broadly black tipped. Clypeus rather concave in front; antennæ short and thick; anterior ocellus scarcely its diameter from laterals, these much nearer each other than to eyes, vertex plainly rounded; pronotum arcuate, almost transverse, metathorax short, convex, bent down behind, no median groove, abdomen short, broad at base, dull beyond second segment, depressed. Legs rather short and heavy, with long spines, longer spur of hind tibiæ two thirds as long as metatarsus. Wings rather long, marginal cell long, acute, second and third submarginal cells subequal, second acute at base, third one half narrowed above; first recurrent near middle; second recurrent arising a little beyond middle of anal cell, slightly bent outward below the middle, and meeting the third submarginal at middle; basal veins interstitial in fore wings, not in hind wings. Length, 8 mm.

From Claremont, Cal. (Baker).

Related to *P. humilis* and *P. snowi*. From the former it differs in markings of wings, from the latter by the dark spurs.

***Psammochares fulvoapicalis*, new species.**

Female.—Black, black hair on head and thorax. Clypeus large, rounded or narrowly truncate in front, distinctly margined; a line from antennæ to ocelli, anterior ocellus hardly its diameter from laterals; vertex nearly straight across; inner orbits slightly concave; antennæ short, convolute, third joint hardly as long as vertex; pronotum angulate behind; metathorax short, much bent downward, with medium groove, sides rather rusty; abdomen slender, cylindrical and compressed toward tip, the last segment mostly fulvous, with some black hairs; legs slender, spiny, anterior femora cylindrical, their coxæ nearly reaching coxæ II, anterior tarsi ciliate, longer spur of hind tibiæ two thirds as long as metatarsus, last joint of hind tarsus beneath without spines. Wings deep black; marginal cell long, acute; second and third submarginals long, subequal in length, both narrowed above; second recurrent vein arising very much beyond middle of anal cell, running nearly straight up to middle of third submarginal, second discoidal being very long; basal veins interstitial in fore wings, much dislocated in the hind wings. Length, 12 to 14 mm.

From Fedor, Lee Co., Texas, Sept. (Birkmann).

***Psammochares maneei*, new species.**

Female.—Black, lower part of face slightly gray pubescent. Clypeus

truncate in front, vertex broad, slightly convex, antennæ rather short and slender, third joint nearly twice as long as first, much shorter than vertex width; anterior ocellus more than two diameters from the laterals. Pronotum long, posterior margin barely arcuate, almost transverse; metathorax moderately long, evenly convex, not widened behind; abdomen subovate, but little longer than thorax, base very broad. Legs rather stout, very spiny, anterior tarsi ciliate, each curved spine more than twice as long as the width of the joint; longer spur of hind tibia three fourths length of metatarsus, last joint of hind tarsi with minute spines beneath; tibia I with distinct bristles above; claws with rather large subbasal tooth. Wings black, broadly deeper on apex; second and third submarginals subequal, both narrowed above, both recurrent veins ending beyond middle of cells, second recurrent arising before middle of anal cell, extending obliquely and rather sinuously to the third submarginal; veins do not reach apical margin. Length, 7 mm.

From Southern Pines, N. C., July (Manee).

Resembles *P. subviolaceus*, but the cilia of anterior tarsi are very much longer.

***Psammochares marginalis*, new species.**

Female.—Near *P. marginatus*, but larger, darker and red of the abdomen more extensive, and basal veins interstitial in front as well as hind wings (in *P. marginatus* dislocated more or less in front wings). Black; clypeus faintly rounded in front, vertex not as narrow as *P. marginatus*, slightly rounded; a distinct line from antennæ to ocelli; third joint of antennæ not nearly as long as width of vertex; pronotum angulate behind; metathorax short, rounded, with median line; third abdominal segment mostly reddish, last dull, punctate, hairy; legs black, anterior tarsi ciliate; longer spur of hind tibiæ two thirds as long as metatarsus; all legs strongly spined. Wings black; marginal cell rather short and broad, acute at tip; second submarginal trapezoidal, barely longer than broad, receiving first recurrent near tip; third submarginal triangular, but not petiolate, nearly as long as second, second recurrent vein arising from middle of anal cell, slightly bowed outward above middle, meeting third submarginal beyond middle.

Male.—Similar, but with a little silvery pile on face. Length, 13 mm.

From Southern Pines, N. C. (Manee).

***Psammochares minusculus*, new species.**

Female.—Black, with silvery pubescence. Clypeus slightly truncate; antennæ short, stout, third joint barely longer than the first; a line from antennæ to ocelli; anterior ocellus scarcely two diameters from the laterals; vertex broad, only slightly convex; pronotum not very long, arcuate; metathorax short and broad, rounded, with median groove; abdomen suboval, broad at base, legs with moderate spines; anterior tarsi ciliate, the spines longer than width of a joint, longer spur of hind tibiæ two thirds length of the metatarsus; wings dusky, darker at tip, marginal cell short, acute; second submarginal

narrowed above, receiving the recurrent before the middle; third submarginal very small, long petiolate; second recurrent arising before middle of outer cell, running nearly vertically to middle of third submarginal cell. Male much more slender, more silvery on face and metathorax. Length, 4.5 mm.

From Fedor, Lee Co., Texas, June (Birkmann). Resembles a minute *P. subviolaceus*.

***Psammochares posticatus*, new species.**

Black, face and clypeus silvery, posterior margin of pronotum broadly white, metathorax behind and pleura and coxæ slightly silvery; abdomen rather dull black, last segment white above; legs black, anterior tarsi brownish, hind tibiæ white above from base to beyond middle; joints 1, 2, 3 and 4 of hind and mid tarsi white, with black on apical parts, joint 5 all black; spurs white; wings nearly hyaline, a very broad black band across tip, covering marginal cell. Anterior margin of clypeus truncate; third joint of antennæ no longer than fourth, not half the width of vertex, posterior margin of pronotum subangular; metathorax nearly evenly convex; abdomen slender; legs long, longer spur of hind tibia about two thirds the length of metatarsus. Marginal cell of wing long, acute; second submarginal acute at base, narrowed above, receiving the first recurrent much beyond the middle; third submarginal not much longer than the second, one half narrowed above; second recurrent vein arises much beyond middle of anal cell, scarcely bent, meeting the third submarginal near middle. Length, 10 mm.

From Fedor, Lee Co., Texas, Oct. (Birkmann).

***Psammochares pretiosa*, new species.**

Male.—Small, black with dense silvery pubescence; abdomen red above on apical part of segment one, all of two, and basal part of three. Head rather narrow; clypeus truncate, almost concave; antennæ short; vertex convex; anterior ocellus large, once and a half its diameter from the smaller laterals; pronotum moderately long, arcuate behind; the metathorax obliquely sloping, not much convex, narrowed behind; abdomen long cylindric, the segments beyond the red are silvery on apical part and brown on basal part. Legs not very slender; longer spur of hind tibiæ fully one-half length of the metatarsus; wings brown, darker at tip; second and third submarginal cells subequal, third narrowed nearly to a point above, second recurrent arising from middle of anal cell and running nearly straight to middle of the third submarginal, marginal cell short and broad. Length, 7.5 mm.

From Sea Cliff, Long Island, N. Y., on the beach.

Related to *P. marginatus*, but easily separated by the densely silvery pubescence, and larger amount of red on the abdomen.

***Psammochares striatulus*, new species.**

Female.—Black, with only short fine hair. Clypeus broadly concave, margined; antennæ long, slender, third joint as long as width of vertex; a

distinct median line from antennæ to ocelli, anterior ocellus about diameter from smaller laterals; vertex slightly rounded; pronotum slightly constricted at hind margin, arcuate; metathorax rather long, evenly convex, posterior part distinctly transversely striate, abdomen shining; short, rather broad at the base; hind tibiæ with very few small spines, metatarsus very long, about twice as long as longer spur. Wings black, barely paler in the third submarginal cell; second submarginal one and one fourth times as long as broad; third nearly as long, slightly narrowed above, receiving the second recurrent at middle, this vein arising much beyond middle of anal cell, and slightly bent below middle; basal veins interstitial in fore wings, slightly dislocated in the hind wings. Length, 11 mm.

From Palmerlee, Ariz. (Biederman).

Closely related to *P. luctuosus*, but with mesothorax striate, a more evenly colored wing, longer second submarginal cell, longer hind tarsi, and less spinose tibiæ.

***Psammochares ventralis*, new species.**

Male.—Black, rather dull and not shining, head and thorax with black hairs; clypeus broad, slightly emarginate in front; vertex nearly straight across; a faint line from antennæ to ocelli; antennæ short and heavy; ocelli large, close together, the anterior ocellus not its diameter from the laterals; pronotum angulate behind; metathorax rather short and narrow, with long black hairs; abdomen slender, cylindrical, apical segments depressed, beneath on penultimate segment there is a tuft of long black hair each side, on preceding segment there is a dense brush from side to side, outer hairs longest, on the segment before this is a sparse brush, the middle hairs of which are very short. Wings black; marginal cell rather short, acute; second submarginal narrowed above, third subtriangular, nearly as large as the second, receiving the second recurrent at middle, the vein bent out at middle, and arising from the anal cell before middle; the veins do not reach apical margin; basal veins nearly interstitial in both pairs. Length, 9 mm.

From Falls Church, Va., 22 Oct.

***Cryptocheilus arcuatus*, new species.**

Female.—Blue black, except the reddish abdomen; all with short pile; clypeus and lower part of face silvery, pleura silvery; legs dull black; spurs yellowish; wings grayish, tip infuscated. Clypeus slightly rounded in front; third joint of antennæ stout, not more than two thirds width of vertex; lateral ocelli as near to eyes as to each other; vertex nearly straight across; pronotum arcuate behind; metathorax short, not as long as broad, sloping to tip, but little convex; abdomen petiolate, shining reddish yellow, scarcely darker toward tip, and there with yellowish hair; legs with very short hairs and spines on tarsi, none below on last joint of hind tarsus; about eight teeth above on hind tibiæ, the metatarsus three fourths as long as tibia, the

longer spur is about one half the length of metatarsus. Marginal cell of wings slender, acute; second submarginal one and a half times as long as broad, receiving the first recurrent vein a little before the middle; third submarginal a little longer and wider than second, one third narrowed towards the marginal, second recurrent arising plainly beyond middle of anal cell, slightly bent above middle, meeting third submarginal barely before middle. Length, 7 mm.

From Fedor, Lee Co., Texas (Birkmann).

***Cryptocheilus coloradensis*, new species.**

Female.—Reddish yellow throughout; a narrow black line connecting tops of eyes and with median extension covering the ocelli, hind borders of thoracic parts black, metathorax with base, anterior angles, and median stripe black, pleura with two broad oblique black stripes, extreme base of abdomen black, parts of coxæ and trochanters black, last two joints of four hind tarsi black; wings reddish black. Clypeus large, rounded, margined; antennæ long and slender, third joint nearly as long as vertex width; anterior ocellus hardly diameter from the laterals; vertex straight across; pronotum short, subangulate behind, scutellum broad, metathorax narrowed behind, oblique, barely rounded, with very long yellow hair. Abdomen moderately slender, anterior femora slender, coxæ I long-haired; spurs on legs rather short, the longer one on hind tibia not one half the length of very long metatarsus; hind tibiæ strongly serrate, claws with basal tooth; no spines under last hind tarsal joint. Wings rather long, marginal cell long, second submarginal nearly twice as long as broad, narrowed above, first recurrent at middle; third submarginal much larger and longer than second, nearly one half narrowed above, second recurrent arising much beyond middle of anal cell, running sinusously to middle of the third submarginal. Length, 15 mm.

From Clear Creek, Colo., 11 Sept. (Osler).

***Cryptocheilus pallescens*, new species.**

Honey yellow throughout, blackish each side of the scutellum, at middle tip of the metathorax, and the petiole of the abdomen black; antennæ dusky from third segment outward; legs slightly dusky on middle and hind tarsi. Clypeus slightly but evenly rounded in front; face smooth, with very short sparse hair; third joint of antennæ much shorter than width of vertex; lateral ocelli rather farther from eyes than from each other; thorax shining, hind margin of pronotum angulate; metathorax evenly sloping to tip; abdomen petiolate, shining, with long hairs near tip, last segment above with short yellow hair. Legs slender, with few hairs except on hind tibiæ; about nine teeth above on hind tibia; spurs yellowish, longer of hind tibia about two fifths of metatarsus; the hairs and spines on tarsi yellowish and very short, last joint of hind tarsi without spines beneath, claws with small tooth beyond middle, hind metatarsus four fifths as long as tibia. Wings slightly dusky, rather darker before the middle, and a cloud over marginal, submarginal and

part of discoidal cells, apex also darkened; marginal cell of moderate length, second submarginal one and a half times as long as broad, with first recurrent before middle; third submarginal barely longer than second, wider than second, narrowed one third toward marginal; second recurrent leaving the anal cell scarcely beyond the middle, outwardly angular above middle, meeting the third submarginal at middle. Length, 7.5 mm.

From Falls Church, Va.

Cryptocheilus placitus, new species.

Female.—Black, lower half of clypeus, antennæ, legs and abdomen yellowish-red. All with very fine dense silvery pubescence, most prominent on sides of pleura and metathorax. Clypeus broad, truncate in front; antennæ slender, third joint but little longer than the fourth; face rather broad, a line from antennæ to ocelli; anterior ocellus two diameters from laterals; vertex slightly convex; pronotum subangulate behind; metathorax slightly and evenly rounded, with a broad median furrow; abdomen subpetiolate, slightly compressed near tip, last segment with yellowish hair. Legs slender, hind tibiæ strongly serrate, the longer spur two fifths of metatarsus; tarsi very slender, first plus second joints of hind tarsi much longer than tibiæ, last joint of hind tarsus beneath without spines. Wings hyaline, tip fumose; third submarginal cell larger than the second, both recurrences meeting cells at the middle, the second recurrent arising from middle of anal cell, and slightly bent outward above middle. Length, 7 mm.

From Fedor, Lee Co., Texas (Birkmann).

Pedinaspis australis, new species.

Male.—Black, with black hair on head and thorax; head narrower than thorax; clypeus truncate in front; a line from antennæ to ocelli; anterior ocellus fully twice its diameter from the laterals; vertex rounded; antennæ very short and thick, not nearly as long as thorax; some gray hairs on sides of face; pronotum long, broader behind, margin slightly arcuate; metathorax nearly level, long, rather narrowed and emarginate behind, scutellum broad; abdomen cylindrical, not longer than thorax, the apical segments with silvery hair; the tip shows below a short forked process and before it a single median tooth; the legs are short and spiny, tibia I not twice as long as spurs, femur cylindrical, the coxæ I do not reach hardly more than half way across the mesosternum, which is very long, and on the middle behind with a lobe projecting over the base of coxæ II; longer spur of hind tibia two thirds as long as metatarsus; no spines below last joint of hind tarsus; all claws with tooth; hind femora very heavy. Wings black, basal veins interstitial, marginal cell acute, second submarginal narrowed above, third shorter and also narrowed above, second recurrent at middle, straight, arising from middle of anal cell, veins not reaching the apical margin. Length, 11 mm.

From Fedor, Lee Co., Texas (Birkmann).

***Pedinaspis luctuosa*, new species.**

Female.—Reddish yellow, antennæ beyond fourth segment black; abdomen mostly dull black, second segment with a large pale yellow spot each side, third segment with a pale basal band, narrowly interrupted in the middle, fifth and apical segments with silvery pubescence, sides of metathorax silvery; legs reddish yellow, tibiæ and tarsi darker, spines pale. Clypeus subtruncate in front; antennæ short, third joint not longer than fourth; faint line above antennæ not reaching ocelli, latter very small, anterior ocellus fully four times its diameter from the laterals, and these as near to eyes as to each other; vertex nearly straight across. Pronotum very long, scarcely arcuate behind; metathorax short, bent down behind and transversely striate; abdomen short, dull, slightly heavy at tip and on venter; legs with few small spines on tibiæ, longer spur of hind tibiæ not quite one half the length of the metatarsus. Wings as in *P. mariæ* and *P. legatus*; yellowish, with basal, narrow submedial, and broad apical fuscous bands; hind wings dusky at tip; venation as in *P. legatus*. Length, 9 mm.

From Fedor, Lee Co., Texas, 29 May (Birkmann).

Differs from *P. mariæ* and *P. legatus* in colors of abdomen and legs, and in the much smaller and more separated ocelli.

***Planiceps pulchella*, new species.**

Female.—Black, abdomen and most of hind femora red, clypeus emarginate; antennæ short, third joint shorter than fourth and shorter than first; vertex straight across; anterior ocellus about one diameter from laterals, latter as near to each other as to the eyes; pronotum long, transverse behind; metathorax rather long, broadest in middle, posterior slope rather concave in middle; abdomen no longer than thorax, compressed toward tip. Anterior legs short, their femora thickened; hind femora red inside and middle of outer side, tibiæ weakly spinose, longer spur of hind tibiæ not one half the length of metatarsus. Wings rather short; marginal cell not very long, but acute, second submarginal very short, broader than long, the first recurrent interstitial with its base, second recurrent before the tip, the second discoidal cell is therefore much broader than long. In the hind wing the cross-vein from upper fork of median vein meets the radial sector close to base (not far out as in most species of this family). Length, 5 mm.

From Falls Church, Va., 21 July; a smaller example from Fedor, Lee Co., Texas (Birkmann), has the middle femora and hind tibiæ reddish.

***Pseudagenia apicipennis*, new species.**

Male.—Black, abdomen and legs mostly reddish yellow; clypeus and basal joint of antennæ above and below yellowish, rest of antennæ brown. Clypeus broadly truncate in front; antennæ rather higher up than usual; face not very long, with fine silvery pubescence, anterior ocellus about its diameter from

the laterals; thorax with silvery pubescence, pronotum arcuate behind, metathorax short, rounded; abdomen very slender, pale yellowish red on the basal half, beyond black, apical segment white above; the legs, including coxæ, are yellowish red, but the middle and hind tarsi are blackish brown, hind tibiæ also brownish; the spurs white. Wings hyaline, apex dark; marginal cell acute at tip, third submarginal cell hardly as long as the second, but little narrowed above, second recurrent vein arising beyond middle of anal cell, running nearly vertically to middle of third submarginal cell; basal veins almost interstitial; stigma dark. Length, 6 mm.

From Fedor, Lee Co., Texas (Birkmann).

***Pseudogenia birkmanni*, new species.**

Male.—Black, spurs white, base of abdomen reddish, apical segment white above; most of body with silvery pubescence. Clypeus truncate; vertex rounded; anterior ocellus rather more than diameter from the laterals; antennæ quite short, third joint but little longer than first. Pronotum subangular behind; metathorax short, rounded; abdomen slender, subpetiolate, segments one, two and most of three reddish both above and below, last segment white above. Legs slender, black, tarsi pale, longer spur of hind tibiæ more than one half length of metatarsus. Wings but little fumose, marginal cell long, acute, second and third submarginal cells subequal, plainly longer than broad, and slightly narrowed above, first recurrent vein before middle of second submarginal, second recurrent at middle of third submarginal, this vein arising from middle of anal cell, and faintly bent outward. Length, 6 mm.

From Fedor, Lee Co., Texas, June (Birkmann). A specimen from Glencarlyn, Va., is apparently the same, but the abdomen is reddish only on first and second segments, and the first has a blackish median spot.

***Pseudogenia externa*, new species.**

Female.—Black, with some slight white pubescence; the legs yellowish red, but the four hind tibiæ and tarsi are black on the outer side, also the anterior tibiæ slightly, and the first and second segments of the abdomen have on each side a distinct rufous spot; the spurs are yellowish, similar to the femora, not white. Clypeus truncate; head narrow, narrower than in *P. mellipes*; eyes large, and inner orbits subparallel; vertex nearly straight across; anterior ocellus a little more than diameter from the laterals; third joint of antennæ one and a half times as long as first; pronotum rather long, longer than in *P. mellipes*, subangulate behind, metathorax silvery on the posterior corners, narrower and less convex than *P. mellipes*; abdomen rather narrow, subcompressed near tip. Legs long and slender, hind tarsi rather longer than *P. mellipes*, the longer spur hardly one half length of metatarsus. Wings smoky, marginal cell rather short, not acute at tip, second and third

submarginal cells subequal, the third only slightly narrowed above and below, much shorter than in *P. mellipes*, first recurrent at middle of second submarginal cell, second recurrent before middle of third submarginal. Length, 7.5 mm.

From Fedor, Lee Co., Texas, 21 June (Birkmann).

***Pseudagenia metallica*, new species.**

Female.—Head black, with rather long white hair; silvery below the antennæ; thorax dark purplish metallic, metathorax with long white hair; abdomen purplish black, with fine grayish pile except on the first and apical segments, legs black. Clypeus large, rounded in front, margined; a faint line from antennæ to ocelli; antennæ short, but the third joint is nearly twice as long as the first; anterior ocellus a little more than diameter from laterals, these much nearer each other than to the eyes; inner orbits slightly and evenly concave; vertex nearly straight across, pronotum very short, slightly angulate behind; metathorax rather long, evenly rounded, median groove very faint. Abdomen rather long petiolate, slender toward tip and subcompressed, last segment concave above, beneath dull gray with some long white hairs; legs slender; anterior coxæ one half their length from reaching mid coxæ, middle and hind tibiæ spined much as in *P. blaisdelli*; longer spur of hind tibiæ scarcely one half length of metatarsus, no spines below on last hind tarsal joint. Wings slightly and evenly infuscate; stigma black; marginal cell long, acute; second and third submarginal cells much longer than broad, the third rather larger, and one third narrowed above, first recurrent at middle; second recurrent arising much beyond middle of anal cell, bowed outward, and meeting the third submarginal before middle. Venation much as in *P. blaisdelli*. Length, 9 mm.

From Claremont, Cal. (Baker).

***Pseudagenia texana*, new species.**

Male.—Black, mostly with very short silvery pubescence, most evident on face and clypeus, some parts of thorax, and the coxæ. Clypeus slightly rounded, frontal stria very faint; vertex rounded; face rather long, anterior ocellus a little more than diameter from laterals; pronotum arcuate behind, mesothorax plainly tricostate above; metathorax elongate, faintly rounded; abdomen small, slender, apical segment white above. Legs slender, anterior pair rufous beyond the middle of femora, middle pair reddish on apical half of femora, tarsi brownish, hind pair with femora reddish, except extreme base, tibia with basal half somewhat reddish, tarsi black; longer spur of hind tibiæ reaching beyond middle of metatarsus. Wings grayish hyaline, apex darker, third submarginal cell barely longer than second, narrowed above, second acute at base, marginal cell rather blunt at tip, second recurrent arising beyond middle of anal cell, curving outward obliquely to middle of third submarginal; basal cross-veins interstitial; stigma dark. Length, 7 mm.

From Fedor, Lee Co., Texas (Birkmann).

Aporus apicatus, new species.

Male.—Black; pronotum with slight silvery pile in front and behind, not as dense as in *A. fasciatus*, hind angles of metathorax silvery; abdomen black, with apical third of segments with white pubescence. Wings blackish, paler near the marginal and second submarginal cells. Body slender, face shining above, silvery below antennæ; pronotum arcuate behind; hind angles of the metathorax sharp; abdomen slender. Legs stout, spined as usual; longer spur of hind tibiæ plainly shorter than the metatarsus. Wings with two submarginal cells, the second twice as long as broad, first recurrent vein near base, second recurrent plainly before tip. Length, 5 mm.

From Claremont, Cal. (Baker). Differs from *A. fasciatus* in having the first abdominal segment silvery only at tip, and in the shorter tibial spurs.

Aporus magnus, new species.

Male.—Black, with dense silvery pubescence, especially prominent on the clypeus, pronotum, posterior angles of metathorax, and on apical half of the abdomen, on the coxæ and legs. Clypeus rounded in front; antennæ very short, heavy and stout; vertex rounded; ocelli large, anterior ocellus about twice its diameter from the laterals, the latter farther apart than from the eyes; pronotum very large and long, barely arcuate behind; posterior margin of metathorax deeply excavate, angles prominent, as in other species; a basilar median furrow. Abdomen narrow, first and basal half of second segment dull black, rest of abdomen densely silvery pubescent. Legs silvery, with short black spines, longer spur of hind tibiæ more than one half as long as metatarsus; wings infusate toward apex, stigma dark, marginal cell acute; three submarginals, second and third subequal, the third a little larger, each but little longer than broad, each receiving a recurrent vein, the second beyond middle, the third at middle. Length, 12 mm.

From Fedor, Lee Co., Texas (Birkmann).

Ceropales robinsoni var. stigmatica, new variety.

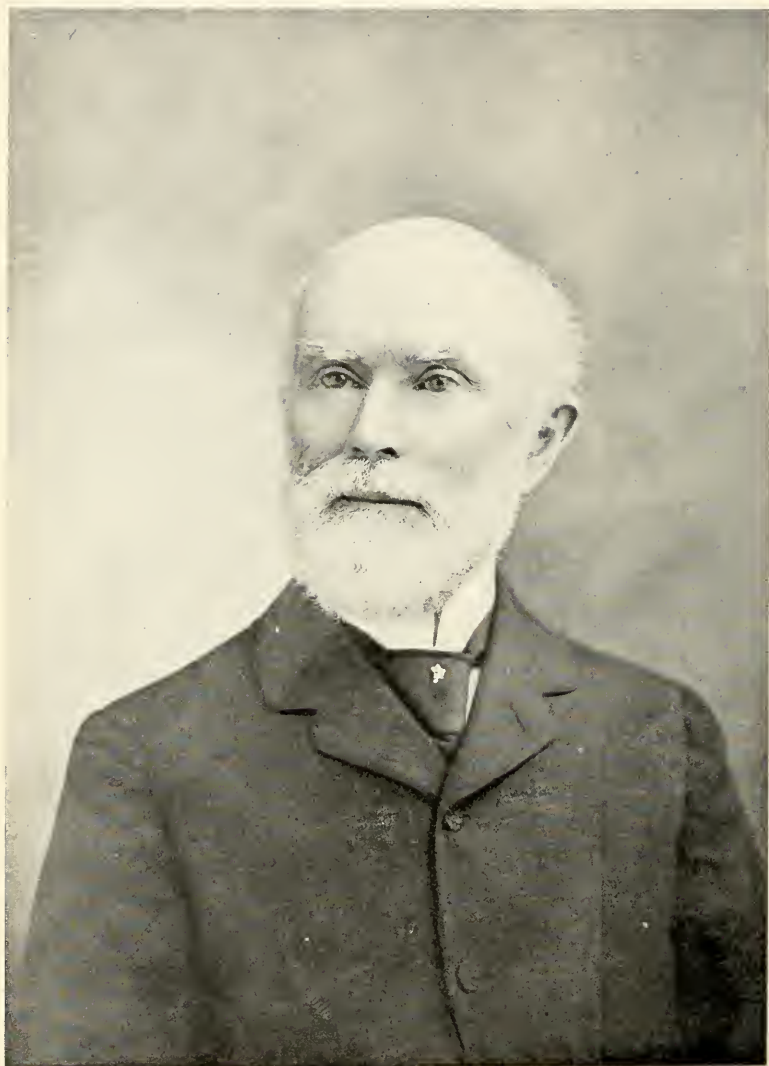
Female.—Very similar in general to *robinsoni*, with markings heavier than in that species; the antennæ reddish or yellowish on basal half, only apical half black; and the stigma of the fore wings clear yellow. Venation very similar to that species, but the marginal cell is longer, also the third discoidal longer, and more of the tip hyaline.

From Fedor, Lee Co., Texas (Birkmann).

Ceropales bipunctata var. tibialis, new variety.

Female.—In general similar to *C. bipunctata*, but legs I and II from trochanter out are reddish yellow, and the hind trochanters, femora and tibiæ are also reddish-yellow, the rest of hind legs brown; in the male these apical joints are also reddish.

From Southern Pines, N. C., June (Manee).



Rev. J. L. Zabriskie.

THE REV. J. L. ZABRISKIE.

The Rev. Jeremiah Lott Zabriskie, a former president of the New York Entomological Society, died on April 2, after a brief illness, in his seventy-sixth year. Notwithstanding his advanced age, Mr. Zabriskie was an active member of the Society, in constant attendance at its meetings. His physical and mental powers were remarkably preserved; he took part in the 1909 Decoration Day Excursion and at the meeting of March 15, about two weeks before his death, he spoke for an hour on the anatomy of *Bruchus discoides*, illustrating his remarks with lantern slides prepared by himself.

Born in the old town of Flatbush, Long Island, February 3, 1835, Mr. Zabriskie received his early education at Erasmus Hall Academy; later he attended Columbia College and was graduated in 1853. He prepared for the ministry at Rutgers Theological Seminary and held many important pastorates up to his retirement in 1883. From that time Mr. Zabriskie devoted his life to studies in natural science, principally in microscopy and the microscopic structure of insects. He was skilled in the preparation of microscopic material; made a collection of sections of wood and mounts of parts of insects. The Society often had the pleasure of hearing him explain the most minute structures and of seeing his figures thrown upon the screen. He also interested himself in the small hymenopterous parasites and reared from the cells of *Ceratina dupla* two very remarkable parasites which have been named in his honor *Diomorus zabriskii* Cres. and *Axima zabriskii* How.

In addition to his activity in the New York Entomological Society Mr. Zabriskie was a member of the Microscopical Society and of the Brooklyn Entomological Society, serving each for many years as its president.

Gifted by nature with a noble presence and a rich and powerful voice, Mr. Zabriskie had further so cultivated his oratory that his addresses before the Society were followed with pleasure by his fellow members, to whom his death, coming though it did painlessly and in the fullness of years, brings with it a sense of irreparable loss.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF TUESDAY, DECEMBER 7, 1909.

Held at the American Museum of Natural History at 8.15 P. M. President C. W. Leng in the chair, with twenty-one members present.

Dr. Lutz, the curator, exhibited the two maps, presented by Prof. Smith, properly mounted for preservation, also the local fifty-mile limit map so far as it was completed. He spoke in a very general way concerning the additions to the local collection.

Mr. Southwick reported progress in regard to the preparation of the volume devoted to the preservation of historical letters. Mr. Miner spoke on "Myriopods—Their General Structure and Classification." He characterized the group Myriopoda, differentiating them from insects and spiders, and outlined their distribution which is almost world-wide, owing to their ability to tolerate extremes of all conditions. He described their food, and spoke of the general lack of interest in the group, because of its slight economic importance, the historical knowledge of the group, the nomenclature and classification. He exhibited a number of excellent lantern slides showing phylogenetic tables, various details of structure, which were commented upon, and some of the typical species.

Mr. Engelhardt spoke on "A Collecting Trip Through North Carolina." He and Mr. Pollard left New York, July 17, for Washington, D. C., where they spent a few pleasant and profitable hours on Plummer's Island with a number of Washington entomologists. Thence they went to the Dismal Swamp, in which so far as collecting was concerned, they were disappointed. As they proceeded further south along the coast they found their best collecting at Roanoke Island, and near Wilmington, N. C. From this point they proceeded west to the Blue Ridge in the western part of the state, where, by means of a wagon, they covered a considerable distance, collecting along the way. Mr. Engelhardt exhibited a number of lantern slides from photographs taken by himself, and discussed some of the interesting incidents, the character of the localities visited, and the peculiarities and habits of some of the mountaineers.

The Society then adjourned.

MEETING OF DECEMBER 21, 1909.

Held at the American Museum of Natural History at 8.15 P. M. President C. W. Leng in the chair, with eighteen members and one visitor, Mr. R. A. Vickery, of Washington, D. C., present.

Mr. Lutz, the curator, spoke concerning the "Local Record Cards" on which he desired to inscribe records from collections other than the local collection in order that they might be as complete as possible.

Mr. Southwick reported progress made by the committee in preserving the historical letters of the Society.

Mr. Dow proposed as an active member Mr. Fred Wintersteiner, 1 Borden Ave., Long Island City, and Mr. Davis proposed Mr. John A. Grossbeck, of the New Jersey Agricultural Experiment Station, New Brunswick, N. J.

On motion of Mr. Schaeffer the by-laws were suspended and the secretary authorized to cast a single ballot in favor of the election of the proposed members.

Mr. Dow moved that the president appoint a nominating committee to prepare a slate for the annual meeting of January 4. The motion was seconded and the president appointed Mr. Dow, Mr. Harris and Dr. Lutz.

Mr. Charles L. Pollard discussed certain features of the Lepidoptera collected on his recent trip to North Carolina with Mr. Engelhardt. He spoke first of the excellent collecting region in the vicinity of Virginia Beach, Va., stating that various northern and southern species met there on common ground. The most interesting butterfly observed was *Calephelis borealis*, which was quite abundant. *Cercyonis pegala* exhibited much variation, *Thecla cecrops* and *Lerema accius* were other species of interest.

At Roanoke Island Lepidoptera were not abundant. Several individuals of *Papilio palamedes* were seen, and one *P. cressphontes* was taken. A specimen of *Debis portlandia* was found in a thick, wooded swamp, the habitat being somewhat unusual for this butterfly.

Mr. Pollard described in some detail the flora and fauna of Smith's Island, at the mouth of Cape Fear River, pointing out that this island, from its proximity to the Gulf Stream, is remarkable for the distinctly southern facies of its biota. *Papilio palamedes* occurred here in abundance, feeding on the flowers of *Metastelina*, and was the only *Papilio* observed. *Anosia plexippus* was entirely replaced by *A. berenice*, but the supposed mimic of the latter, *Basilarchia floridana*, was not seen. *Eurema euterpe* and *E. elathea* were taken. *Phyciodes phaon* replaced *Ph. tharos*; and several southern Hesperidae, as *Eudamus proteus* and *Prenes ocola* were also collected. The speaker referred briefly to the apparent scarcity of nocturnal and crepuscular Lepidoptera, very few having been taken either at light or sugar. In the mountains two male individuals of *Argynnis diana* were captured, also a *Debis* which it was stated might prove to be *D. cleola* Skinner. Specimens of all of the species referred to were exhibited by Mr. Pollard.

Following Mr. Pollard's remarks Mr. Engelhardt spoke of the remaining orders in which collections had been made and exhibited a large number of specimens.

Mr. Engelhardt's observations along the coastal regions from Virginia Beach, Va., to Cape Fear, N. C., showed a very gradual transition from the northern to the southern fauna, so that, roughly estimated, the southern forms at Wilmington, N. C., did not exceed twenty-five per cent. In the mountains weather conditions interfered greatly with collecting, but of the specimens obtained not over ten per cent. could be called characteristically southern. Among others the following insects were mentioned:

Colcoptera.—*Tetracha carolina* and *virginica*, both at Wilmington, N. C., and the latter also at Wilkesboro (altitude 1,500 ft.). *Cicindela gratiosa* was common on sandy roads in pine woods near Wilmington; *C. marginata* and *dorsalis* were swarming on the beach at Smith's Island; *C. patruela* at Linville Falls (2,500 ft. elevation); *Cychrus elevatus* was taken in the Dismal Swamp. It was black in color with thorax narrow and raised, and five others were taken at Wilkesboro. They were black with the thorax much broadened. *Cychrus andrewsii* and *bicarinatus* occurred throughout the mountains but were not common; *Pasimachus marginatus*, *sublaevis* and *depressus*, the first two at Wilmington and the latter on the mountains only; other species were *Pterostichus fallax*, *Callida viridis*, *Chlenius angustus*, *Coccinella oculata*, *Mallodon melanopus* and *dasytorius* from Wilmington; *Lucanus elaphus* and *Polymachus brevipes* from Blowing Rock (4,000 ft.). By means of an acetylene bulls-eye lantern many species of Carabidæ were captured at night.

Orthoptera.—About forty species were taken, including *Conocephalus hoplomachus* from Wilmington and *Ecanthus esclamationis* from Johnson City, Tenn. Of interest is the aquatic habit of *Orchelimum volantum* which was abundant about the grassy borders of Greenfield Pond near Wilmington. When pursued and hard pressed it would dive into the water and cling to a submerged grass stem or the underside of a water-lily leaf, where it remained for several minutes, sustained by a supply of air which showed in glistening bubbles adhering to its body.

Hymenoptera and Diptera.—No special attention was paid to these orders. The specimens exhibited included many large and showy, but for the most part well-known species. A number of specimens of the so-called "yellow flies," and a species of *Chrysopa*, were pointed out as a great nuisance in Lake Drummond in the Dismal Swamp.

Odonata.—These were reported as being very numerous though restricted in the number of species. *Celithemis fasciata*, said to be very local, was found to be not uncommon at Wilmington, where Mr. Pollard also captured one specimen of *Gomphoides ambigua*, a new record for the United States, as this species has hitherto been recorded only from Mexico and Guatemala.

Myrmeleonida.—Seven or eight members of this family were observed in the coastal regions, including *Acanthaclisis americana*, the largest North American species, at Wilmington.

Hemiptera.—About sixty species including a *Hygromystes* and a *Gelastocoris*, both from Roanoke Island, and not yet described. *Banasa packardi* was met with in countless numbers clinging to the twigs and small branches of a cedar in Smith's Island. In color it resembled the scale-like leaves of the tree.

Cicadida.—Seven species were taken, two from Smith's Island and one from Blowing Rock, not yet determined. Four specimens of *Carinecta parvula*, all females, were taken at Wilmington. At frequent intervals was heard an unusual song of a *Cicada*, sounding almost without exception from the high branches of pine trees. After many attempts one specimen was captured and

proved to be *Cicada pruinosa*. Apart from its structural characters it can readily be distinguished, even at quite a distance, by the peculiar song; this is a prolonged *zip* . . . accompanied at intervals by a metallic *twang-twang*.

Mr. E. D. Harris stated that recent correspondence with Mr. H. P. Loding, of Mobile, Ala., had elicited some facts regarding the periodicity of the local Cicindelids that will be of interest, and which Mr. Loding has kindly permitted him to communicate to the Society.

The forms taken by him in southern Alabama are *Tetracha carolina*, *Cicindela repanda*, *hirticollis*, *nigrior*, *unicolor*, *sexguttata*, *rufiventris*, *cumatilis*, *punctulata*, *severa*, *abdominalis*, *souleyi*, *tortuosa*, *blanda*, *hamata*, *togata* and *gratiosa*. The season opens with *unicolor* early in March, and this form continues until the latter part of May, disappearing to come again in October, late specimens occurring in the last part of December even up to Christmas. It varies in color from a deep blue to bright green, but is always immaculate. Mr. Loding expressly stating that he "has never seen any specimens with the least signs of markings." The closely related form of *nigrior* appears in the latter part of September and remains till the end of November. It is observed also in the spring. The two forms, *unicolor* and *nigrior* are not locally associated. The first specimens of *repanda* and *gratiosa* appear towards the end of March and remain till into September, the latter frequenting white sand, "high and dry," all over Mobile Co. *Blanda* occurs at Oak Grove and Grand Bay, "on wet white sand near creeks," from May to August. *Punctulata* appears in May, followed by *tortuosa*, and later by *abdominalis*, this last being very common on roads and paths until late in September. *Scabiosa* has not been observed, though careful search has been made for it. *Hamata* occurs near the water edge along the bay and gulf shores, through June, July and August. *Sauleyi*, with its immaculate form, is there in June and July. *Rufiventris* and *cumatilis* occur in greatest abundance in July and occasionally belated specimens linger till late in September. *Togata* occurs at Coden on sandy salt marshes. *Hirticollis* occurs sparingly with *repanda* in mid-summer. *Sexguttata* is not common, Mr. Loding reporting that he has taken but one specimen in five years. *Severa*, one of the rarer forms, occurs at Coden. "It keeps close to grass, is not shy, and is out more morning and evenings than in the middle of the day." The black form is the more common, the green being only occasionally met with. It is found on sandy salt marshes. Mr. Loding observes that in a series of *unicolor* taken in the middle of October of this year, all males had "the labrum and at least part of the mandibles white, and all females had both labrum and mandibles black or bluish."

Mr. William T. Davis exhibited dried specimens of a wild bean (*Phaseolus polystachus*) and some beans from the same species infested with a small weevil (*Apion griseus*).

Mr. Shoemaker exhibited a beautiful hand-painted specimen of the brilliant Australian butterfly, *Ornithoptera priamus*.

Mr. Dow recorded the capture of *Cicindela oncocisconensis* Harris at De Bruce, Sullivan Co., N. Y., at an elevation of 1,700 ft. Mr. Leng mentioned

its further occurrence in the White Mountains, Buffalo, N. Y., and Pineville, Va.

The Society then adjourned.

ANNUAL MEETING, TUESDAY, JANUARY 4, 1910.

Held at the American Museum of Natural History. Vice-President E. B. Southwick presiding. Twenty-five members and one visitor present.

The minutes of the preceding meeting were read and approved.

The treasurer, Mr. Davis, read his annual report as follows:

Society Account.

Balance January 1, 1909.....	\$ 991.01	
Received from dues	187.50	
Interest on deposits.....	28.16	
Total	\$1,206.67	
Disbursements during 1909.....	65.51	
Balance		\$1,141.16

Journal Account.

Balance January 1, 1909.....	91.75	
Received, subscriptions and sale of Journal.....	377.67	
Received, sale of donated insects.....	6.50	
Total	475.92	
Disbursements for printing and mailing Journal..	437.40	
Balance		38.52
Total Balance		\$1,179.68

Mr. Davis reported the election of twelve and the resignation of one member during the year, and a hundred and twenty-one subscribers to the Journal.

Mr. Dickerson in behalf of Mr. Harris read the report of the auditing committee as follows: "The auditing committee begs leave to report that it has made an examination of the treasurer's books and vouchers, and that the balances shown, amounting to \$1,179.68, are correct, and on deposit in the Harlem Savings Bank and in the Produce Exchange Bank in the name of the New York Entomological Society. The committee finds that the bills filed by the treasurer have been regularly examined and approved by the proper committee before payment, and that the treasurer has exercised his usual solicitude and care in the collection of the accounts due, and the protection of the interests of the Society in its financial department."

Respectfully submitted,

EDWARD D. HARRIS,
EDGAR L. DICKERSON,
E. B. SOUTHWICK.

On motion of Mr. Groth the report was accepted and placed on file.

On motion of Dr. Osburn a vote of thanks was extended to the treasurer and secretary for their services.

The librarian reported the purchase of a number of pamphlet cases and of the General Catalogue of Coleoptera authorized by the Society. The regular exchanges had been carried on as usual and since the last meeting the following papers, etc., had been received:

Mittheilung d. Schweiz. Ent. Gesellschaft, Vol. XI, No. 10.

Monogr. Revision of the Order Strepsiptera. W. D. Pierce.

A Decade of N. A. Formicidæ. W. M. Wheeler.

A Small Collection of Ants from Victoria, Australia. W. M. Wheeler.

Predarwinian and Postdarwinian Biology. W. M. Wheeler.

Ants Collected by Professor F. Silvestri in the Hawaiian Islands. W. M. Wheeler.

The Ants of Isle Royale, Mich. W. M. Wheeler.

Ants Collected by Professor Silvestri in Mexico. W. M. Wheeler.

Die Metamorphose der Insekten von P. Deegener. W. M. Wheeler.

Coleopterorum Catalogus, Parts 1, 2, 3.

Bull. Soc. Entomol. d'Égypte, 1909, Nos. 1, 2.

Insects Injurious to Shade Trees. J. B. Smith.

Report of the Ent. Dept. N. J. Agri. Exp. Station, 1908.

Jahresheft d. Vereins f. Schesische Insektenkunde, 1909, No. 2.

The Insect World, XIII, Nos. 5, 6, 7.

Societas Entomologica, XXIV, Nos. 15, 16.

Mittheilungen Naturhist. Museum Hamburg, Vols. VI, VII, VIII, IX, XI, XII, XIV.

The Canadian Entomologist, XLI, No. 12.

The N. Amer. Dragonflies of the Genus *Macromia*. E. B. Williamson.

Studies of N. Amer. Weevils. W. D. Pierce.

Revue Russe d'Entomol., VIII, Nos. 3, 4; IX, Nos. 1, 2.

Proc. Calif. Acad. Sciences, III, pp. 49-56.

Zeitschrift fur Wissensch. Insektenbiologie, V, No. 11.

Wiener Entomol. Zeitung, XXVIII, Nos. 9, 10.

The curator, Dr. Lutz, reported among other things the receipt for the local collection of *Papilio palamedes*, taken at West Hoboken, N. J., July 8, 1908.

Mr. Dow, of the nominating committee, placed on nomination:

President—C. W. Leng.

Vice-President—Dr. Raymond C. Osburn.

Secretary—H. G. Barber.

Treasurer—Wm. T. Davis.

Librarian—C. Schaeffer.

Curator—Dr. F. E. Lutz.

Delegates to the Academy of Sciences—Dr. E. B. Southwick.

Executive Committee—Dr. J. L. Zabriskie, G. W. J. Angell, G. P. Engelhardt, C. L. Pollard, C. E. Slaight.

Publication Committee—C. Schaeffer, Dr. W. M. Wheeler, Dr. R. C. Osburn, Dr. F. E. Lutz.

On motion of Mr. Angell the nominations were closed.

On motion of Mr. Groth the by-laws were suspended and the secretary instructed to cast a single ballot for the nominations as read.

Mr. Southwick resigned the chair to the newly elected Vice-President Dr. Raymond C. Osburn.

On motion of Mr. Groth a hearty vote of thanks was extended to all of the outgoing officers.

The resignation of Mr. W. H. Browning was presented and accepted on motion, with regrets.

A circular letter from the James Fletcher Memorial Fund was read by the secretary and referred to the executive committee for action.

Dr. G. Lagai was proposed as an active member of the Society Mr. William Brenner, 83 Bleecker St., N. Y. City.

On motion of Mr. Groth the by-laws were suspended and the secretary instructed to cast a single ballot for the election of Mr. Brenner.

Dr. Lutz moved that a committee of three be appointed by the chair to draft resolutions of sympathy to be sent to Mr. Doll and recorded in the minutes concerning the death of his wife.

Mr. Angell exhibited some original pencil drawings made by Dr. Le Conte of *Platyssylla castoris*, compared them with the published illustration, and referred to the ability of Dr. Le Conte as an artist.

Mr. Wm. T. Davis, under title "Remarks on Insects Collected in Northern Georgia," spoke concerning some of the more interesting insects which he captured on his recent trip to Georgia and exhibited all of the material collected. Among other things he spoke of finding under a stone, on the side of Black Rock Mountain, a larger spider that was quite active though it had what was evidently the larva of an hymenopterous parasite attached to the base of its thorax.

Under stones and old logs several colonies of a very primitive ant, *Stigmatomma pallipes* Hald. were found. He quoted Professor Wheeler's remarks on this species from "The Ants of New Jersey." An interesting feature in one of the nests was a lamellicorn beetle larva to which a number of *Stigmatomma* larvæ, in various stages of growth, were attached.

He collected a number of *Canthon chalcites* Hald. and observed many others rolling their balls of manure. Comment was made upon several interesting observations concerning these tumble-bugs.

Under the bark of trees species of Myriopoda, belonging evidently to the family Geophilidæ, were found closely coiled about their eggs—about fifty in number in order to guard them from harm. Two specimens of the yucca moth, *Pronuba yuccasella*, were exhibited and their habits commented upon.

Mr. Ernest Shoemaker exhibited and spoke briefly concerning some rare beetles collected during the past summer. Among those mentioned were:

Leptotrachelus dorsalis Fabr., Brooklyn, N. Y.

Cymindis cribricollis Dej., Eagle Rock, N. J.

Helluomorpha nigripennis Dej., District of Columbia.
Brachylobus lithophilus Say, Brooklyn, N. Y.
Necrophorus sayi Lap., Brooklyn, N. Y.
Anthaxia viridifrons Lap., Montgomery Co., Md.
Clerus lunatus Spin., Rockaway Beach, L. I.
Geotrupes balyi Jek., Eagle Rock, N. J.
Strangalia virilis Lec., District of Columbia.
Typocerus lunatus Fabr., District of Columbia.
Acanthoderes quadrigibbus Say, Alexander Co., Va.
Eupogonius vestitus Say, District of Columbia.
Oberea oculaticollis Say, Montgomery Co., Md.
Oberea myops Hald., District of Columbia.
Donacia flavipes Kirby, Saranac Lake, N. Y.
Syneta ferruginea Germ., Great Notch, N. J.
Lema sayi Cr., Alexander Co., Va.
Pachyonychus dimidiaticornis Cr., District of Columbia.
Microrhopala xerene Neum., District of Columbia.
Odontota bicolor Oliv., District of Columbia.
Odontota horni Smith, District of Columbia.
Rhipiphorus pectinatus Fal., Rockaway Beach, N. Y.
Sphenophorus ochreus Lec., Rockaway Beach, N. Y.
The Society then adjourned.

H. G. BARBER,
Secretary.

Helluomorpha nigripennis Dej., District of Columbia.
Brachylobus lithophilus Say, Brooklyn, N. Y.
Necrophorus sayi Lap., Brooklyn, N. Y.
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The Society then adjourned.

H. G. BARBER,
Secretary.

THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

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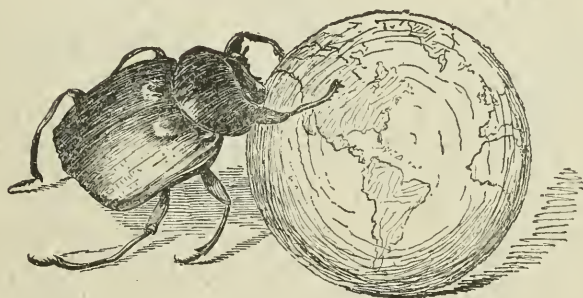
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JOURNAL
OF THE
NEW YORK
Entomological Society.

Devoted to Entomology in General.



SEPTEMBER, 1910.

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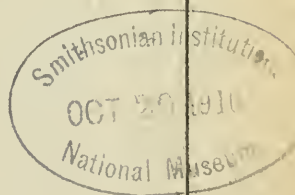
Published Quarterly by the Society.

LANCASTER, PA.

NEW YORK CITY.

1910.

[Entered April 21, 1904, at Lancaster, Pa., as second-class matter, under Act of Congress of July 16, 1894.]



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JOURNAL

OF THE

New York Entomological Society.

Published quarterly by the Society at 41 North Queen St., Lancaster Pa., and New York City. All communications relating to the JOURNAL should be sent to the editor, W. M. Wheeler, Bussey Institution, Forest Hills, Boston, Mass. all subscriptions to the Treasurer, Wm. T. Davis, 46 Stuyvesant Place, New Brighton, Staten Is., New York, and all books and pamphlets to the Librarian, C. Schaeffer, Museum, Eastern Parkway, Brooklyn, N. Y. Terms for subscription, \$2.00 per year, strictly in advance. *Please make all checks, money-orders, or drafts payable to NEW YORK ENTOMOLOGICAL SOCIETY.*

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JOURNAL

OF THE

New York Entomological Society.

VOL. XVIII.

SEPTEMBER, 1910.

No. 3.

NOTES ON THE NORTH AMERICAN SPECIES OF AGROPERINA HAMPSON.

BY JOHN B. SMITH, ScD.,

NEW BRUNSWICK, N. J.

(PLATES IV AND V.)

Agroperina is described in the Catalogue of the Lepidoptera Phalaenæ in the British Museum, Vol. VII, 398, 1908, as follows: "Proboscis fully developed; palpi upturned, the second joint reaching about to the middle of frons and fringed with hair in front, the third short, porrect; frons smooth; eyes large, rounded; antennæ of male ciliated; head and thorax clothed with hair and hair-like scales, the latter with indistinctly double ridge-like dorsal crest; tibiæ moderately fringed with hair; abdomen with dorsal crests on basal segments, some rough hair at base and lateral fringes of hair. Fore wing rather narrow, the apex rectangular, the termen obliquely curved and slightly crenulate; veins 3 and 5 from near angle of cell; 6 from upper angle; 9 and 10 anastomosing with 8 to form the areole; 11 from cell. Hind wing with vein 3, 4 from angle of cell; 5 obsolescent from just below middle of disco-cellulars; 6, 7 from upper angle; 8 anastomosing with the cell near base only."

The generic type is given as *A. lateritia* Hufn., a common species of wide distribution in Europe, Asia and North America. Most of the other species referred here are strictly North American and they include species heretofore referred to *Hadena* (*Xylophasia*) and

Orthosia. These species are *dubitans* (*sputatrix*), *cogitata*, *lateritia*, *illustra*, *conradi*, *lutosa*, *helva*, *inficita* and *morna*. Of these *illustra* was unknown to Hampson in nature, and its association with the others in the genus is not warranted. *Hadena morna* Streck., of which *hulstii* Grt., is correctly made a synonym, is incorrectly identified—perhaps on my authority—and that belongs to *Sidemia* Staud., as used by Hampson, and very much resembles the *Hadena subornata* Staud., from Mongolia, as figured on Hampson's Plate CXVIII, f. 31.

The remaining species comprise the three former *hadenids*, *lateritia*, *dubitans* and *cogitata*, separated by Hampson from the others because of the white lunule on the outer edge of the reniform, and the orthosiid species *conradi*, *lutosa*, *helva* and *inficita* in which the reniform has no white. The two series have very little in common, really, and none of the orthosiid series would run down to the genus *Agroperina* in the synoptic table of genera, although the *hadenid* species would. Nevertheless, for convenience, and because the orthosiid species are really homeless elsewhere, they may be conveniently considered here.

A. lateritia has more pointed and more trigonate wings than either *cogitata* or *dubitans*, and the generic characters apply perfectly. The thoracic vestiture is composed chiefly of flattened hair which tends to become somewhat broader at tip and in well-preserved specimens the basal tufting on dorsum is also evident. In the male antennæ the joints are scarcely marked and the ciliation is hardly grouped as a tufting, although most obvious at the middle of each joint. In the series before me extending clear across the continent north of New York, down the Sierra Nevada Mountains into California and down the Rocky Mountains into Colorado, there is no confusing variation. The purplish red-brown color varies little—sometimes a little more rusty, sometimes a little more smoky; but always very uniform and without contrasting maculation. The white-edged reniform is the most obvious bit of ornamentation, the t.p. line may have a series of whitish venular points, and the s.t. line may be traceable by a paler shading; but for the rest it may be set down as merely traceable. Dates of flight range from June into August.

The male genitalia have the characteristic ladle-shaped tip of the large *hadenids*, fringed with spinules and with a spinulose area at the lower margin: the clasper is small and rather slender, tapering rather

evenly to the tip. The uncus is dilated before the tip and that feature is characteristic in the series. The chitinous penis-sheath has two saw-tooth processes near the tip and is quite characteristic in form. No other species referred here agrees closely with this form which is also the largest of the series.

Hampson makes *satina* Strck., a synonym of this species, and that agrees with my own note which refers to the type as an undersized, rubbed *lateritia*. Strecker's specimen is from Anticosta, and I have from Grand Lake, Newfoundland, two male examples which are, I believe, referable to Strecker's species. The male genitalia differ only in minor details and *satina* is probably no more than an undersized variation.

Cogitata Smith is similar in color, a little more purplish as a rule; but the primaries are decidedly shorter, broader and the apex less produced. The vestiture of the thorax is rather more scale-like and the tuftings are better marked, especially the posterior dorsal tuft, while the dorsal tuftings of the abdomen tend to become complete. There is little more maculation than before, but there is a tendency to completely outline the reniform in white, and there is a central white mark or lunule which often fuses with the other mark, leaving a white blotch with or without a central brown line. The median lines may be altogether lost, indicated by pale powderings, or by venular dots only. There is nearly always a fairly obvious pale s.t. line and usually also a pale line at the base of the fringes.

The male antennæ are very similar to those of *lateritia*. The genitalia of the male offer several characteristic differences. The uncus is very slender and not dilated before the tip; the ladle-shaped tip of *harpes* is much smaller and the patch of spinules at the angle is very much reduced. The clasper, on the other hand, is much stouter and very decidedly longer. The penis-sheath is of quite different form and, instead of two saw-teeth, there is a single small spinule. Two dissimilar examples from Kaslo, B. C., and Sierra Nevada, California, showed absolutely no material differences in structure. The distribution of this species is very similar to that of *lateritia* and the dates of flight are also about the same.

Of this species also I have specimens, two males and four females, from Grand Lake, Newfoundland, in August, and they also are undersized and somewhat thinly scaled, bearing the same relation to normal

cogitata that *satina* does to *lateritia*. The male genitalia are figured and show only such differences as are due to smaller size and method of mounting.

Dubitans Wlk., = *sputatrix* Grote, is very close to the preceding, but is suffused with black-brown, and in most cases has the normal noctuid maculation easily traceable, though never prominent. The marking of the reniform is as in *cogitata*, while the orbicular and claviform are also defined and readily traceable. At first blush there might seem some difficulty in differentiating between *cogitata* and *dubitans*, for some of the latter show decidedly brown at times, while some of the former tend to blackish; but keeping this tendency to a complete maculation in mind the difficulties vanish. The vestiture now becomes even more scale-like and the thoracic tufting even more distinct. In good examples there is an anterior divided crest and a well defined posterior crest, while the dorsal abdominal tuftings are complete.

The structure of the male antenna does not differ from that of *cogitata*; but the male genitalia are in some respects nearer to those of *lateritia*. The ladle-like tip is large, the fringe of spines is well marked and the patch at the inner angle is large. The clasper is as slender as in *lateritia*, but much longer, while the uncus has no trace of dilation and is even more attenuated than in *cogitata*. The penis-sheath has two spines instead of one and is characteristic in form.

This species is much more limited in distribution than either of the preceding and does not extend across the continent. Its home is in the Middle and New England States, but it ranges into Canada, westward to South Dakota, and southward to Virginia. Dates of flight are in July and August.

One other character common to all the previously described forms should be mentioned. In each case the males have a long-stalked hair pencil at the base of the abdomen, and there is a characteristic groove extending between dorsal and ventral surface of two segments into a pocket extending through the third, and into the fourth from base. Of the orthosiid series *helva* alone has this pencil and pocket. All the others lack both pencil and pocket entirely, and have no other secondary male characters to replace them.

Of this orthosiid series, *helva* is the best known and quite distinct from all others. It has shorter and broader wings and all the normal

maculation of primaries is complete. The ground color is fulvous yellow tinged with reddish, and the maculation is purplish brown to blackish. The basal and median lines are geminate, the median shade is conspicuous, and the s.t. line is defined by a preceding purplish shade. The ordinary spots are completely outlined and the reniform inferiorly is dark-filled. Altogether an unmistakable form, in which there is little variation except that due to a fading of the darker lines.

The vestiture is narrowly flattened hair, forming on thorax a small longitudinal crest divided anteriorly and posteriorly. The dorsal tufting of the abdomen does not extend beyond the middle in any case. The male antennæ are ciliate, but there is also a single long bristle on each side of each joint.

The genitalia of the male are of the usual type: the tip of the harpe is much broader than in any other species, with a rather large patch of small stout spinules at inner angle; clasper rather long and moderately slender. The uncus is very slender, but slightly dilated before the pointed tip. Sheath of penis almost evenly cylindric, with two little denticles near the tip.

This species occurs in August and September from Canada to Virginia, and west to the Rocky Mountains. I have not seen any specimens from the western slope.

Lutosa Andrews is a pale yellowish gray species more or less powdered with reddish and sometimes, especially in the female, very decidedly rufous even in ground. The wings are much narrower than in *helva* and obtuse at tip. The normal maculation is all present but never conspicuous, and the most obvious feature is the dusky filling of the inferior portion of the reniform. Very rarely the entire reniform is dusky and gives the specimen a somewhat unusual appearance.

The thoracic vestiture is mostly flattened hair, the intermingled scales being in many cases short, broad, spatulate forms, set upon a very long hair-like stalk. The dorsal tufting is very obscure, forming a low, keel-like ridge slightly divided in front and scarcely marked behind. In the average example in collections, this tufting is practically indistinguishable. The abdominal tufting is at base only, and never conspicuous, even there, while of most females, even in good condition, it might be said that they are untufted. In the males the lateral tuftings are generally distinct.

The antennæ of the male are simple, ciliate, with single lateral bristles that are not much more prominent than the other hairs.

The genitalia of the male are of the same general type as the preceding and very close to those of all the following species. The ladle-like tip is moderate or rather small in size, but really more spoon-shaped, with a coronal fringe of spinules; but without the patch of spinules at the inner or anal angle which is found in all the preceding forms. The clasper starts differently and forms a shoulder or angle at the base. The uncus agrees with that of *helva* in a general way, and in all the following species there is a slight dilation beyond which the tip is rather long drawn out. There is some difference between the penis-sheaths in the species; but these have not been well enough compared to determine how much is due to difference in position or point of view.

As for the rest of the species they have been hopelessly confused in collections under the names *conradi*, *citima*, *morna*, *exornata*, *belangeri* and *inficita*, where they have been named at all, and I long ago abandoned any idea that I knew the species until Sir George F. Hampson was able to compare specimens critically. He was good enough to look over a series of specimens that I sent him and from these, supplemented by my own accumulations and by a splendid series from Dr. Barnes, I have been able to reach what I think is a correct conclusion.

Concerning *Orthosia belangeri* Morr. there never was much doubt, and Hampson refers this positively as equal to *Graphiphora inficita* Wlk. Of a specimen that I sent him for comparison, he said that it was absolutely identical with Walker's type.

Under *Orthosia conradi* Grote, specimens showing a considerable range of variation appear in collections; but the name *citima* Grote appears rarely. Hampson refers *citima* as a synonym of *conradi* and in this he seems to be right. The type of *citima* is in the Neumoegen collection, and I sent a carefully compared specimen to Hampson, who returned it "almost exactly like type of *conradi* and exactly like *citima* of Schaus collection, compared with type."

More or less mixed with the above, is a species that I have called *exornata* Moeschl., and have distributed under that name. Of this Hampson said that it did not agree with that species in the B. M. collection, but seemed to him a variety of *inficita* Wlk. I have now

the true *crornata*, and Hampson was right in pointing out my error; but the form is not *inficita* Wlk.; it grades insensibly into the form which is described and figured by Hampson as *morna*. Dr. Barnes has a magnificent series of examples from the Yellowstone, Colorado, and various British American points and two series of these can be separated. I have called one of these species *indcla*, and the other *lincosa*.

An off-shoot from the above, but I think distinct, is what I believe Hampson refers to as "Ab. 2," of *A. morna*. "Head, thorax and fore wing deep rufous; abdomen and hind wing more tinged with rufous." I have called this *pendina*, and believe all the forms now in collections, belonging to this series, can be placed under one or the other of the above names.

Agroperina inficita Wlk. = *belangeri* Morr. is the darkest and best marked species of the series. The primaries are dark luteous brown and the secondaries dark smoky, almost blackish. The maculation of the primaries is complete, the median lines single and the median shade well-defined, rusty brown, strongly angulated on the reniform. The s.t. line is of the ground color, relieved against the darker terminal space and preceded by a darker shade in the s.t. space. The ordinary spots are present, the orbicular feebly marked, the reniform always dusky inferiorly, sometimes all dark and usually more or less definitely outlined by paler scales.

The antennæ of the male have the joints slightly marked, ciliate, the cilia somewhat grouped into tufts, without longer lateral bristles. There are no obvious dorsal tuftings on the abdomen and the vestiture consists of flattened hair without obvious scaly admixture. The flattening of the hair is mostly at the tip, giving the individual hair somewhat the appearance of a miniature long-handled shovel.

There is very little variation in this species so far as my material extends; the coloring is very uniform and the relative relief of the spots and lines shows only a slight difference. All the material seen by me comes from Quebec or Newfoundland, and all the dates are in August.

The genitalia of the male do not differ in any very important feature from those of *lutosa*. The harpes are somewhat less angulated, and the constriction before the dilated tip is less marked. The other differences can be more easily appreciated by comparing the figures than from descriptions.

Agroperina conradi Grt. = *citimq* Grt. is distinguished by Hampson from its allies by having the s.t. space paler than the rest of the wing, and that is the general impression given when examining a series; but if the individuals are closely examined it will be found that many of them do not fit. There is, however, in addition to this, a general rough, powdery appearance which carries the species in a series even when the color is almost uniform. Very often the terminal space is darker than the rest of the wing, and that also helps out in the recognition of the species. All the normal noctuid maculation is present; but none of it is contrasting. In well-marked examples the median lines are geminate and the median shade is easily traceable but this median shade is never defined as in *inficita*, and tends to disappear altogether. The s.t. line is always traceable and nearly always well-defined. Usually the terminal space is as dark as, or darker than the rest of the wing, and generally there is also a dusky shade preceding the s.t. line. A claviform is traceable in well-marked examples; but usually it is altogether absent. The orbicular is always traceable and varies somewhat in form; but is never large nor conspicuous. The reniform is rather large, centrally constricted, and tends to become dusky inferiorly; its outer margin is often paler and sometimes the entire mark is paler than the median area. The ground color varies from a sordid luteous brown to a very decided reddish.

The thoracic vestiture is hairy, only a little flattened, forming no distinct crestings and only a loose tuft posteriorly. The abdomen is untufted except for a loose dorsal tuft at base. The antennæ of the male have the joints marked, the ciliæ laterally grouped, without longer bristles—altogether a little more marked than *inficita*.

The genitalia of the male do not differ much from those of *inficita*, but are figured for comparison. Altogether, although this is a variable species in details, its general habitus is remarkably constant.

I have before me 10 males and 16 females from various points in Colorado, from Calgary, Alberta, and Winnipeg, Manitoba, and Hampson cites also "Arizona." All dates are in July.

***Agroperina indela*, new species.**

Ground color reddish luteous, very even, tending to an overlay of reddish. Primaries with all the normal maculation traceable in the best-marked specimens; but tending to become entirely lost, some examples being immaculate except for the dusky inferior portion of reniform. Median lines single, in

course like those of *conradi*. S.t. line at best only traceable when the terminal space is a little darker and there is a darker shading in the s.t. space. Claviform barely indicated in some females; usually quite lost. Orbicular lost or faintly pale ringed, varying in shape. No median shade. Reniform moderate in size, constricted, a little dusky inferiorly, tending to become lost, in rare cases completely pale ringed. Secondaries dull smoky yellowish, paler at base.

Expands, 35-43 mm. = 1.40-1.70 inches.

Habitat.—Yellowstone Park, Wyoming, in July; Sheridan, Idaho; Glenwood Springs, Gunnison and Garfield Co., Colorado, July, August, September; Bozeman, Montana, in July; Pullman, Washington, June 24.

A series of 41 males and 16 females—most of them from Dr. Barnes's collection.

The species is *conradi* with all the powdering gone and most of the maculation washed out. It is probably the form figured as *morna* by Hampson and, while it varies greatly, it retains a characteristic appearance. There is no chance of confusing it at any time with *conradi*; but it may conflict at times with the following, *lineosa*.

The vestiture consists of hair and flattened hair and forms no thoracic crests. In good males the loose vestiture gives the appearance of dorsal tufts. The male antennæ have the joints marked and tufted as in *conradi*, but appear a little thicker.

The genitalia are also essentially like those of *conradi*.

Agroperina lineosa, new species.

Reddish luteous with a slightly smoky tinge, sometimes with a trace of purplish. All the normal maculation neatly but not contrastingly written. Median lines simple, fine, the t.p. crenulate. Median shade usually obvious, traceable in all specimens. S.t. line distinct, paler than the adjacent shades. Claviform traceable in a few cases only, lost in most instances. Orbicular usually lost, sometimes outlined by brown scales. Reniform of the usual constricted form, rather conspicuously dusky inferiorly—this feature with the angulated median shade forming the most conspicuous feature of the species. Secondaries yellowish, smoky, darkening outwardly, with a well-defined median shade line and usually a discal lunule.

Expands, 35-41 mm. = 1.40-1.65 inches.

Habitat.—Calgary, Alberta, in July; Brandon, Cartwright, Aweme, Miniota and Winnipeg, Manitoba, all in July.

A series of 25 males and 5 females; with an additional male and 2 females from Olds, British Columbia, so poor that determination is uncertain; but which probably belong here.

The vestiture is hairy with only a slight admixture of flattened hair, forms no obvious crest, but does form a well-defined basal tuft. Abdomen with only a loose dorsal tufting at base. Antennæ of male like those of *indela*.

The genitalia of the male are similar to those of *indela* and *conradi*, but have the clasper distinctly longer and the margin of the harpes different in outline. Two figures of this form, taken from specimens differing in appearance and from different localities, agree with each other and differ equally from the figure of *indela*.

It is very easy to mix this form with *indela* and I was strongly inclined to consider them as identical until I noted the genitalic differences, slight as these are. But, once a series is separated out, the neat transverse lines, the well-defined median shade and rather conspicuous dark marking of the reniform emphasize the species. Withal the two are very close and, in the females especially, it will be easy to confuse them. The males are much more readily discriminated.

***Agroperina pendina*, new species.**

Ground color rather deep luteous red-brown. Primaries darkening a little outwardly, so that the concolorous s.t. line is slightly relieved. Median lines lost or only traceable; t.a. line usually all gone; t.p. line more usually traceable and sometimes accompanied by a slightly paler shading. Claviform lost in all the specimens before me. Orbicular usually traceable, often lost entirely, never well-defined. Reniform of the usual constricted type, laterally often with pale defining lines and inferiorly dark filled. There is only the vaguest trace of a median shade in any specimen. Secondaries distinctly yellowish, with a rather definite, broad, smoky outer border, a narrow median dusky line, and a more or less obvious discal lunule.

Expands, 35-43 mm. = 1.40-1.70 inches.

Habitat.—Calgary, Alberta, in July; Winnipeg, Brandon, Miniota, Manitoba, June and July; Olds, British Columbia, August.

Differs from all the other species in the uniform deep reddish shade of head, thorax and primaries, on which latter the usual maculation is almost obsolete. The yellow color of secondaries with the unusually definite outer border is also quite characteristic and tends to differentiate the species. It is really nearer to *indela* than to *lincosa* in character of primaries, though it resembles the latter more nearly in the secondaries. A series of 13 males and 6 females is before me for comparison.

The vestiture is mostly hairy with some flattened hair intermixed,

forming only a fairly obvious basal tuft on thorax and loose basal tufts on abdomen in the male. In the female there is no distinct dorsal tufting on the abdomen.

The antennæ of the male have the joints marked and the ciliations arranged toward the centre, but not in definite tufts. In this connection it may be said that the antennal differences noticeable between allied species are often more apparent than real. In examining a long series of specimens otherwise closely resembling each other and from the same locality, it becomes apparent that the ciliations quickly become broken and thinned out. A perfectly fresh, new example will have the ciliations longer than the width of the segments and quite apparently grouped in a loose central tuft, so that the member appears "bristle tufted." A flown specimen, obviously the same, will have the fringes broken, part of them lost and so thinned out that they lose the tufted appearance and so seem more evenly arranged as well as more scanty and shorter. The actual form of the antennal segment, however, forms a good discriminating character in many instances.

The male genitalia of *pendina* are nearer to those of *indela* than to those of *lincosa*. The form of the clasper is very similar, and so is the general form of the harpes. But the ladle-like expansion is decidedly broader, and the shape of the penis-sheath is materially different. Comparison of the figures given will demonstrate these differences which are more easily seen than described.

Arranged in tabular form the species may be separated as follows, using Hampson's general grouping and characters.

SYNOPTIC TABLE OF AGROPERINA.

- | | |
|---|------------------|
| 1. Primaries with a small white lunule on outer edge of reniform..... | 2 |
| Primaries without such a lunule..... | 4 |
| 2. Primaries with a white lunule in center of reniform..... | 3 |
| Primaries without such a lunule..... | <i>lateritia</i> |
| 3. Primaries purplish red-brown..... | <i>cogitata</i> |
| Primaries purplish red-brown, suffused with black-brown..... | <i>dubitans</i> |
| 4. Primaries fulvous yellow tinged with rufous; maculation purplish or blackish, conspicuous, broken, giving the wing a mottled appearance..... | <i>helva</i> |
| Primaries even in color, markings continuous, not contrasting or conspicuous | 5 |
| 5. Primaries grayish white, irrorated with rufous..... | <i>lutosa</i> |
| Primaries luteous to fulvous yellow and red brown..... | 6 |

6. Primaries irrorated with brown, s.t. space paler than the rest of the wing *conradi*
 Primaries not irrorated, s.t. space concolorous.....7
7. Primaries deep brown, with conspicuous median shade; secondaries blackish *inficita*
 Primaries lighter in color, without conspicuous median shade, secondaries pale to smoky yellowish.....8
8. All the transverse maculation neatly marked though not conspicuous. *lineosa*
 Transverse maculation wholly or in great part lost.....9
9. Pale yellowish to pale reddish luteous; secondaries whitish to smoky, without definite outer border..... *indela*
 Deep luteous red-brown; secondaries yellow to smoky, with a definite outer dark border..... *pendina*

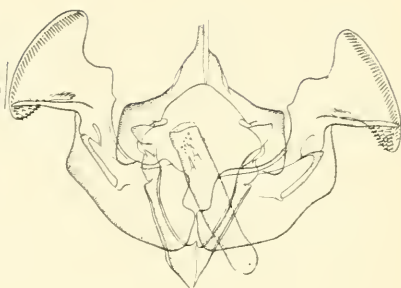
EXPLANATION OF PLATES IV AND V.

Male Genitalia of the Species of Agroperina.

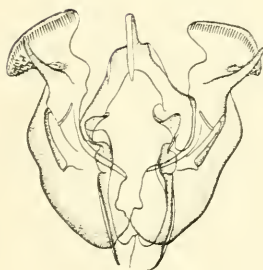
- 1. *A. lateritia* Hfn. Colorado specimen.
- 2. *A. satina* Strck. Newfoundland specimen.
- 3. *A. cogitata* Sm. Colorado specimen.
- 4. *A. cogitata* Sm. Sierra Nevada specimen.
- 5. *A. cogitata* Sm. Newfoundland specimen.
- 6. *A. dubitans* Wlk. New Jersey specimen.
- 7. *A. dubitans* Wlk. So. Dakota specimen.
- 8. *A. helva* Grt. So. Dakota specimen.
- 9. *A. lutosa* Andrews. New Jersey specimen.
- 10. *A. inficita* Wlk. Quebec specimen.
- 11. *A. conradi* Grt. Colorado specimen.
- 12. *A. conradi* Grt. Calgary specimen.
- 13. *A. indela* Sm. Montana specimen.
- 14. *A. lineosa* Sm. Calgary, Alta., specimen.
- 15. *A. lineosa* Sm. Brandon, Man., specimen.
- 16. *A. pendina* Sm. Calgary specimen.



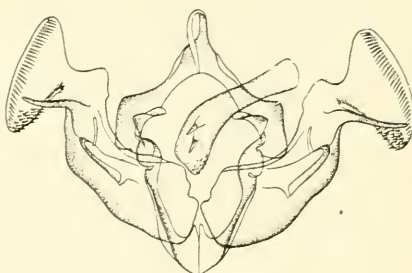
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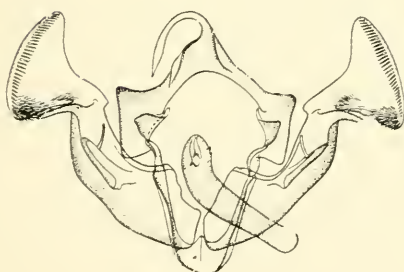
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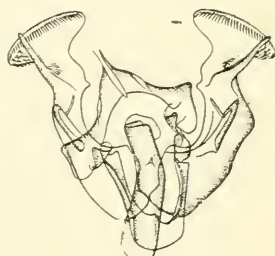
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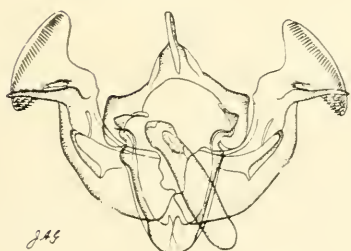
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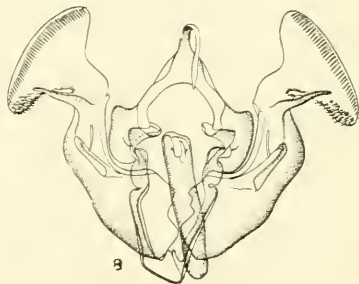
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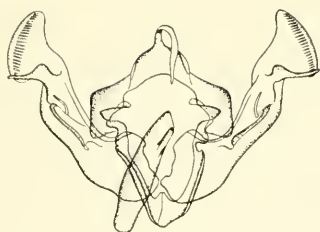


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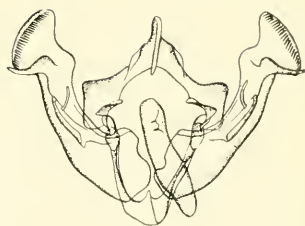


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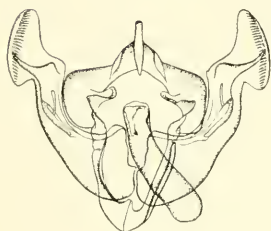
Agroperina



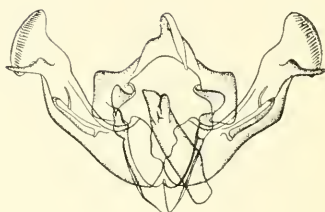
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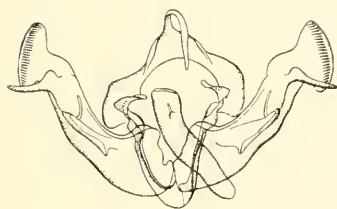
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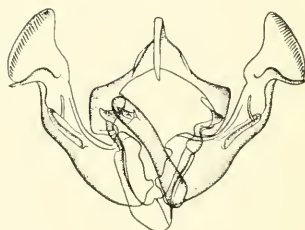
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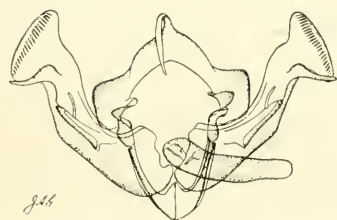
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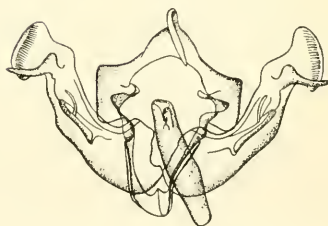
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16



10



15

Agroperina

NEW SPECIES AND VARIETIES OF NORTH AMERICAN LEPIDOPTERA.

BY WM. BARNES, S.B., M.D., AND J. MCDUNNOUGH, PH.D.,

DECATUR, ILL.

ARCTIIDÆ.

1. *Apantesis sociata*, new species.

Female.—Head and thorax deep black brown; anterior portion of thorax with red band partially hidden beneath collar; abdomen vermillion dorsally, with a confluent row of black dorsal spots, beneath blackish; primaries deep chocolate brown; at one half distance from base an ochreous dash extends from costa inwards to cubital vein, slightly angled inwardly on costa; this is followed towards apex by a small ochreous spot; fringes concolorous with wings. Secondaries vermillion, with broad irregular dark brown marginal border, extending to anal angle, and similar colored spot just beyond cell. Beneath, as above, rather paler.

Expanse, 34 mm.

Allied to *A. placentia* S. & A. but much smaller; the ochreous dash on median area of primaries and the broad marginal border of secondaries may serve to distinguish it from this species. It is probably merely a good geographical race.

Habitat.—Ft. Wingate, N. M. (June 16–23). 1 female. Type, Coll. Barnes.

2. *Opharus* (*Phægoptera*) *astur fumata*, new variety.

A long series of both sexes from Arizona differs from the type form in that both wings are much more suffused with smoky brown and the white bands of spots crossing primaries are considerably smaller, especially in median area. Typical *astur* does not probably extend north of Mexico. Our N. American race is sufficiently distinct to merit a name. Exp., male 42 mm.; female 50 mm.

Habitat.—Palmerlee, Ariz., Huachuca Mts., Ariz. (July 8–15). Type, Coll. Barnes.

3. *Hemihyalea splendens*, new name. Syn. *mansueta* Druce (*nec* H. Edw.).

The species figured by Druce as *mansueta* Edw. (Biol. Cent. Am. Het., Pl. 10, f. 1) and placed by Hampson as a subspecies of *labecula* Grt. proves, on examination of a good series, to be distinct.

The name *mansucta* being already employed in the genus for a form of *cornua* H. S. we would propose the above name for this species, and append following description:

Palpi dark gray beneath, black above; third joint almost entirely black, black lateral dot at base of second joint with a slight reddish shading, antennæ bipectinate in both sexes, brown; head and thorax dark gray, especially noticeable in female; patagia with black dot and central stripe, bordered inwardly with white; abdomen pink, last segment sometimes with black patch, beneath gray, with a double lateral black stripe; tibiæ and tarsi gray ringed with black; anterior femur more or less pinkish. Primaries hyaline, more or less sprinkled with black and various shades of gray; five black patches on costa with gray interspaces indicate the usual bands, of which the subbasal one alone is continued nearly across wing; basal portion of inner margin gray, followed by two black patches separated by gray, in female more or less confluent; discocellulars and basal portion of vein M_2 , as well as cubitus at origin of Cu_2 , black; veins in subterminal area tinged with black; outer margin dark brown, shaded inwardly with light gray and containing some diffuse black marks; fringes smoky, checkered with gray at extremities of veins, most prominently at anal angle. Secondaries hyaline, smoky gray, with slight discal dot and dark outer margin towards apex. Beneath as above, more hyaline, markings less distinct; costal border of secondaries gray, terminated by black.

Expanse, male 53 mm.; female 60 mm.

Habitat.—Palmerlee, Ariz. 4 males, 4 females. Type, Coll. Barnes.

NOCTUIDÆ.

4. *Euxoa pimensis*, new species.

Male.—Antennæ fasciculate, palpi light ochreous clothed with black hairs on second joint; front slightly tuberculate, gray, edged posteriorly with black; collar, thorax and patagia gray, former with an indistinct darker band of brownish; primaries gray with a slight purplish tinge; subbasal line geminate, edged prominently with black on costa, then rather indistinct; t.a. line geminate, forming a prominent angle on costa, the apex of which touches the orbicular, then slightly angled inwardly below cubitus and oblique to inner margin at one third distance from base; orbicular large, almost circular, partially defined by black, reniform indistinct, with black margin on basal side, both spots concolorous with wing, claviform absent, t.p. line geminate, dentate, from a point on costa above reniform strongly outcurved to well beyond same, then gently curving to inner margin two thirds from base; subterminal line indistinct, defined by some pale scaling, edged outwardly with smoky; terminal line brownish, fringes smoky, lighter at base. Secondaries pure white, somewhat hyaline. Beneath, primaries whitish, shaded with buff, with prominent black spot on costa, one third from apex; secondaries as above.

Expanse, 37 mm.

This species is allied to *termessus* Sm. and *nævulus* Sm., differs however in the much lighter ground color and the angled t.a. line, as well as other minor points of detail. It may be distinguished from *itodes* Sm. by the larger orbicular and the lack of dark centre to the reniform.

Habitat.—Babaquivera Mts., Pima Co., Ariz. 1 male. Type, Coll. Barnes.

5. *Polia purpurea*, new species.

Male.—Antennæ strongly fasciculate, palpi covered with long gray hairs; front and collar dark gray, crossed by an indistinct double black bar; thorax and patagia lighter, sprinkled with brownish in anterior portion; abdomen brown; primaries of a dark purplish-gray, suffused with lighter in median and subterminal areas; slight black basal dash with traces of light gray shading between it and costa; subbasal line not visible; t.a. line only visible as a black geminate lunule on inner margin about two fifths from base; orbicular large, circular, light gray with darker central shading, very strongly edged with black towards base of wing, less so on outer side and on base, open more or less towards costa, which at this point is same shade of color as orbicular; claviform prominent, distinctly outlined in black, filled with dark reddish purple; reniform large, outlined very heavily with black on base and inner margin, open towards apex of wing, lower portion dark purple, upper portion light gray, shaded with reddish and containing an indistinct dark lunule; reddish shade extending outwardly beyond reniform to t.p. line, defined sharply towards anal angle by black shade; median area between orbicular and reniform dark purple, remainder light purplish gray, extending outwardly to subterminal line in lower portion of wing; t.p. line very indistinct, geminate, lunulate, preceded in lower portion by slight dark shade; costal portion of subterminal area dark, remainder light purplish gray, veins marked with black; subterminal line slightly incurved between costa and vein R_6 , straight to M_3 , rather nearer outer margin to Cu_1 , thence gently incurved to anal angle; with the exception of costal portion, which is indistinct, shaded inwardly with dark blackish brown; terminal area sprinkled with gray at apex and along outer margin; terminal row of small black lunules; fringes smoky, slightly sprinkled with gray. Secondaries smoky, veins darker. Beneath, primaries smoky, shaded with gray along costa and outer margin; traces of dark markings on costa near apex; secondaries whitish, sprinkled with dark brown, with prominent discal spot and median line formed of dashes on the veins, fringes white.

Expanse, 38 mm.

Habitat.—Palmerlee, Ariz. 1 male. Type, Coll. Barnes.

This species is allied to *subjuncta* G. & R., lacks however the black dash of submedian fold and the prominent t.p. line of this latter species.

6. *Polia tristis*, new species.

Male.—Antennæ fasciculate; head and thorax black-brown, sprinkled with white scales, collar tipped with white and with black transverse band, patagia edged with white; primaries, deep purplish gray, shaded in median area with brown; black basal dash, edged on costal side with ochreous; subbasal line indistinct, strongly outcurved below costa, thence with sharp angle to end of basal dash; t.a. line only visible near inner margin as two black lunules, edged with white inwardly, the upper one much the larger, closely approached to the t.p. line and connected with it by black dash, the area above this dash being distinctly brown; orbicular oblique, oblong, gray, imperfectly edged with black and preceded by some gray scaling on costa; reniform large, strongly hollowed out towards apex of wing, gray, shaded with darker and outlined inwardly with black; between reniform and t.p. line is a distinct brown area; t.p. line indistinct in costal half, angled sharply inwardly near inner margin at a point connected with t.a. line by black dash; subterminal line angled below costa, preceded opposite reniform by patch of gray and black scaling, indistinct in lower portion; anal angle filled with gray and yellow scaling, defined towards costa by black dash; fringes light, checkered with darker. Secondaries smoky gray, with broad dark outer margin. Beneath, primaries, smoky, shaded with gray, with indistinct discal dot and median band; secondaries whitish, sprinkled with dark brown along costa and inner margin, with discal dot and median band more prominent than on primaries.

Expanse, 31 mm.

This species superficially resembles the preceding, differs however in the details of maculation, and may be distinguished readily by the cross-bar between t.a. and t.p. lines, and the lack of the prominent subterminal line of *purpurea*.

Habitat.—Palmerlee, Ariz. Type 1 male. Coll. Barnes.

7. *Cirphis dissimilis*, new species.

Female.—Ground color of body and primaries deep purple brown; maculation very indistinct; orbicular small, circular, filled with yellowish brown; reniform similar in color, not well defined; t.a. line almost obsolete, traces of it discernible as a sharp yellow-brown tooth below cubitus; t.p. line very faint, curved, formed of a series of yellow-brown lunules; subterminal line represented by a few darkish spots edged outwardly with yellowish; on costa near apex two or three white spots; a terminal row of minute yellow dots at extremity of veins; fringes concolorous with wings. Secondaries dusky, semi-hyaline towards base and inner angle. Beneath, primaries smoky, shaded with purple-brown along costa and outer margin and slightly sprinkled with ochreous; spots on costa and extremity of veins as above; secondaries, lighter than above; hyaline area more extended, prominent discal spot present.

Expanse, 41 mm.

The genus *Cirphis* Wlk. has been made by Hampson to include most of the species at present placed under *Leucania*. Although the outward appearance of our species does not show much resemblance to the known North American forms, it agrees closely in structure. It would appear to possess most affinity to *Leucania lutina* Sm. as far as we can judge by the description.

Habitat.—Chiricahua Mts., Ariz. 1 female. Type, Coll. Barnes.

8. *Morrisonia albidior*, new species.

Female.—Palpi whitish, with sparse black hairs on outer side; front ochreous, transversely banded below antennæ with dark brown; collar, thorax and patagia whitish, edged with light brown, collar crossed by a band composed of black dots; metathorax with tuft of dark black scales. Primaries, ground color creamy, only prominent at base of wing and along costal margin; on the inner margin this creamy color is entirely obscured by dark purplish brown, which on the discal portion of wing assumes the form of longitudinal striations; the terminal area is shaded with grayish purple. None of the ordinary lines are distinct; the subbasal is entirely lacking and the t.a. line is only defined by a dark spot on costa and several indistinct dark brown markings near inner margin about one third of the distance from base; the position of the orbicular is given by a single dark point, above which on costa is a slight brownish shade; the reniform is small, s-shaped, and composed of black scales with a whitish central portion; a few dark dashes on veins near inner margin mark the position of the t.p. line; in the outer one half of wing along costa is a series of five or six black spots; from a point just below apex a prominent dark brown shade extends inward, gradually curving to a point on inner margin slightly basad of anal angle; in the central portion this shade is edged outwardly with whitish and the portion of the wing exterior to it is tinged with grayish purple; fringes dark brown, checkered with ocher. Secondaries smoky, with discal spot of underside showing through, fringes slightly lighter. Beneath, primaries ground color as above, shaded with smoky; on costa three fourths from base a black transverse dash; between which and apex a more intense ochreous color prevails; traces of the oblique subapical dash and of the reniform are visible, fringes as above, preceded by a terminal row of black spots; secondaries semihyaline with prominent discal spot, costal area creamy, sprinkled with black; in outer third a faint line, parallel to outer margin and more heavily marked on veins; a terminal row of black dots, not reaching inner angle.

Expanse, 28 mm.

Habitat.—Redington, Ariz. 3 females. Types, Coll. Barnes.

9. *Trachea (Hadena) probata*, new species.

Female.—Palpi ochreous, shaded with fuscous; head and thorax purplish brown, sprinkled with buff; primaries, ground color purple-brown, shaded

with ochreous, maculation very indistinct, subbasal and t.a. line not traceable, a few ochreous markings occupying their presumable position; some black markings in central portion of median area; orbicular small, open towards costa, otherwise heavily outlined in black, reniform large, filled with ochreous, and with black margin towards base of wing, below it slight black dash; t.p. line indistinct, well outcurved below costa, then proceeding close to reniform in a gentle curve to inner margin, shaded outwardly with ochreous; three buff dots on costa in subterminal area and several indistinct dots on veins forming a row parallel to t.p. line; subterminal line most prominent of all lines, inwardly dentate, irregular, shaded on basal side with black and outwardly with pale ochreous; terminal space lighter than remainder of wing; terminal row of black lunules; fringes dusky with ochreous basal line. Secondaries smoky, lighter towards base. Beneath, light buff sprinkled with purple brown; costa of primaries with dark patch beyond middle, followed by lighter markings; secondaries with indistinct discal dot and median band.

Expanse, 40 mm.

Habitat.—Huachuca Mts., Ariz. 1 female. Type, Coll. Barnes.

The species is allied to *H. ethnica* Sm.; can be separated however by the prominent ochreous reniform.

10. *Perigea contrasta*, new species.

Female.—Palpi, collar, thorax and patagia deep brown sprinkled with lighter, front and base of antennæ ochreous; primaries deep brown, slightly irrorate with lighter, the whole median area with the exception of a costal patch of brown being milky white; a white subbasal line extends half across wing edged with black interiorly on costal portion; between this and the t.a. line the ground color is darker, containing near costa a few white scales; t.a. line geminate, filled with white, composed below orbicular of two prominent outcurved lunules; t.p. line geminate, strongly outcurved and dentate from costa to below reniform, thence composed of large incurved lunules to a point on inner margin two thirds from base; orbicular circular, white with black center, irregularly outlined with black; reniform very large, contracted in middle, giving the appearance of a figure eight, white, scaled with black in center and outlined with same color; claviform outlined in black on the white median ground color; from its outer extremity a thin black line extends to inner margin; the space between orbicular and reniform, extending from costa downwards to near base of latter spot, brown, the remainder of the median area being milky white; outside this area on costa three white spots; subterminal line wavy, vague, arising from darkish patch on costa; a series of small terminal dark lunules, with slight traces of white intershading; fringes dark, streaked with lighter brown opposite extremities of veins; secondaries ochreous at base with a broad smoky brown margin, a large discal dash and a sinuous median line most marked towards the anal angle; fringes dark preceded by a terminal blackish line; underneath, primaries brown sprinkled with ochreous along costa and outer margin; inner margin entirely

ochreous; the three white dashes of upperside on costa near apex repeated; just basad of first an indistinct blackish band crosses wing; a discal lunule is also present; secondaries ochreous sprinkled with brown except at base, median dentate brown line and round discal spot more prominent than on upperside; fringes of both wings light, on primaries edged with darker brown.

Expanse, 34 mm.

This species, easily recognizable by the broad white central area, seems best placed, according to Hampson's tables, in the genus *Perigea*, although the palpi are shorter than in most of the other members of the genus. The abdomen is unfortunately rubbed in the specimen before us, so we are unable to state whether it is tufted or not.

Habitat.—Redington, Ariz. 1 female. Type, Coll. Barnes.

11. *Oligia (Hadena) fractilinea albescens*, new variety.

Distinguished from the typical form by the greater extent of the light buff-colored area of primaries, leaving only some slight dark shading along costa and a narrow irregular border along outer margin; reddish tinge on wing much less prominent; reniform centered with white; other markings obsolete; secondaries much paler in color in both sexes, light buff.

Habitat.—Vineyard, Ut., Provo, Ut. (15–24 Aug.). Described from 2 males and 5 females. Type, Coll. Barnes.

This is probably the western race of this species.

12. *Cerma albipuncta*, new species.

Palpi dark blackish brown edged inwardly with lighter; front ochreous; collar, thorax and patagia dark brown sprinkled with gray; primaries, ground color deep sepia brown, more or less sprinkled with gray and slightly olivaceous scales; t.a. line at about one fourth the distance from base, rather dentate, very slightly outcurved, black, edged with lighter shades, especially on costal portion; orbicular very small, circular, edged with black and filled with scales of a more or less pronounced olivaceous tint; reniform prominent, white, with slight black scaling in central portion, and preceded by a dark shade; t.p. line single, black, dentate, strongly outcurved just below costa, thence slightly oblique to a point on inner margin two thirds from base, edged outwardly with grayish; subterminal line irregularly dentate, preceded, especially towards anal angle, by black arrow-like dashes; terminal space lighter than remainder of wing, shaded with gray and olivaceous and terminated by a row of black dashes; fringes basally dark gray, outer portion somewhat lighter. Secondaries dark smoky gray, lighter towards base, with slightly dentate median line and small discal spot; along outer margin to anal angle a terminal row of dark dashes; fringes smoky. Beneath, primaries smoky, sprinkled on costa and outer margin with ochreous, with dark median band, slightly angled at costa,

the angle being filled with ochreous scaling; secondaries as above, but considerably lighter, especially at base.

Expanse, 25 mm.

This species shows considerable affinity to *Cerma marina* Sm. and *Hadena smaragdina* Neum., lacks however the green markings, and possesses in the male bipectinate antennæ. The above description is from a strongly marked specimen; in other specimens before us the maculation is much more indistinct and the primaries present a general dark suffused appearance; the white reniform is however always prominent.

Habitat.—San Diego, Calif. (Oct. 8–15). 6 males, 1 female. Types, Coll. Barnes.

13. *Oxycnemis grandimacula*, new species.

Male.—Palpi, collar, thorax and patagia gray sprinkled with black; front ochreous; collar crossed by a faint transverse black band; primaries dark smoky gray, sprinkled with lighter; a short black dash extends from base along radius; t.a. line single, black, slightly outcurved; t.p. line black, faint, especially in costal portion, gently curved around reniform, lower portion towards inner margin shaded prominently with white on exterior side; all spots very prominent; orbicular oval, filled with light ochreous and defined in black; reniform slightly larger, similar in color, open towards costa; from lower exterior portion a black dash extends to outer margin; a similar black dash, parallel to the first, crosses t.p. line at the upper extremity of white shade, following the course of vein Cu_2 ; from the point of intersection a black dash extends backward to upper portion of claviform; this spot is very large, resting basally on t.a. line, and outlined in black, the lower boundary line extending back to base of wing; the whole space to the base is filled with ochreous scales; extremities of veins marked with black; terminal row of black dots. Secondaries white, marked with gray on costa and at extremities of veins. Beneath whitish, sprinkled with gray on costa, apex, inner margin of primaries, and slightly so on costa of secondaries.

Expanse, 28 mm.

This species is related to *subsimpler* Dyar, lacks however the white apical dash and presents numerous other points of difference in maculation. The structure is essentially that of *Oxycnemis*.

Habitat.—Redington, Ariz. 1 male. Type, Coll. Barnes.

14. *Viridemas minuta*, new species.

Male.—Palpi minute, eyes very large, round, naked, front smooth, antennæ fasciculate. Collar and thorax whitish, shaded with brown, patagia slightly yellowish; posterior thoracic tuft largely brown. Primaries, basal por-

tion light sap green, bordered outwardly by t.a. line, which is black, single, and slightly outcurved in central portion; a black subbasal line is present, proceeding obliquely outward to below cubitus, thence sharply angled to base of wing; a slight dark brown shade in central portion of green area; orbicular small, circular, outlined in black; reniform with dark shade in upper portion and black margin; claviform a black dagger-shaped mark resting on t.a. line, median area grayish white, shaded slightly with smoky towards inner margin; t.p. line black, strongly bent around reniform, touching it at lower extremity; incurved until opposite claviform, thence almost straight; subterminal and terminal areas grayish white shaded with green; prominent black patch on costa before apex; subterminal line only present as a slight irregular dark shade; terminal black line; fringes, grayish white. Secondaries smoky, somewhat lighter towards base, fringe white. Beneath, primaries dark with white fringes; secondaries white, sprinkled along costa and outer margin with smoky brown, and with broad dark discal patch.

Expanse, 19 mm.

This species seems to fit very well into the above genus, although we hardly agree with Dr. Smith as to the position this genus should occupy. In the original description (Ann. N. Y. Acad. Sci., XVII, pt. II, p. 91) it is placed at the very beginning of the Noctuidæ, among genera characterized by hairy eyes and prominent vein 5 on secondaries, most of which will probably be placed by Hampson in his new subfamily Mominæ. We should feel inclined to place the genus far down in Hampson's subfamily Acronyctinæ, characterized by naked, non-ciliate eyes and obsolescent vein 5 of secondaries.

Habitat.—Kerrville, Tex. 1 male. Type, Coll. Barnes.

15. *Antapлага grisescens*, new species.

Female.—Head, thorax and abdomen creamy, slightly shaded with yellow on collar; ground color of primaries smoky brown, thickly covered with very pale olivaceous scaling, leaving very little trace of ground color, except at apex and along inner margin; scaling thickest along basal half of costa; secondaries light smoky brown. Beneath, primaries fuscous; secondaries, pale buff, without markings.

Expanse, 21 mm.

This species belongs in the *thoracica* group; the specimen before us lacks its fringes, but is otherwise fairly fresh.

Habitat.—Deming, N. Mex. (Sept. 1-7). 1 female. Type, Coll. Barnes.

16. *Nocloa dissimilis*, new species.

Head and thorax olivaceous brown; abdomen light gray; primaries light olivaceous brown, shaded with darker, presenting a distinct velvety appearance;

subbasal line represented by a black dash on costa; t.a. line single, black, angled below costa, then very slightly oblique, and strongly outcurved below submedian fold, lower portion edged inwardly with white and followed in median area by a white shade; orbicular and reniform indistinct, outlined in white, former small with dark center, latter constricted in middle, lower portion filled with dark scales, upper portion with yellowish central bar; median area usually shaded considerably with blackish, sometimes confined to the lower outer portion; t.p. line well outcurved below costa, perpendicular opposite reniform, then inwardly oblique to inner margin, slightly irregular, single, black, edged with ochreous outwardly and followed in subterminal area by a diffuse light olive shade with a distinct bronze tinge; subterminal line diffuse, irregular, close to termen in central portion, incurved at anal angle, preceded usually by a dark shade; terminal row of black lunules; fringes dusky, with basal yellow line. Secondaries smoky, lighter towards base, with black median curved line and terminal row of lunules. Beneath, primaries smoky gray, with black median line and several ochreous spots on costa near apex; secondaries light buff, sprinkled with darker and with prominent median line.

Expanse, 31-34 mm.

Habitat.—Redington, Ariz. 6 males, 3 females. Type, Coll. Barnes.

This species resembles an *Hadena* at first sight, rather than a *Nocloa*, agrees however in structure with this latter genus, possessing a reduced proboscis, and cup-like frontal process with central tubercle, as well as naked antennæ in both sexes.

17. *Azenia pulchra*, new species.

Male.—Palpi, front, collar and thorax pale ochreous, slightly tinged with darker yellow; primaries yellow with a decided olivaceous tinge, base and costal margin lighter and more ochreous; t.a. line barely visible as a slightly darker shade, strongly outcurved below costa, thence directed obliquely inwardly to a point on inner margin less than one third distance from base; the orbicular is represented by a dark brown dot; the reniform is indistinctly outlined with darker scales, small, oval; t.p. line brown, sharply angled below costa, thence oblique and slightly dentate to inner margin two thirds from base; at its origin on costa a small dusky patch; it is also slightly shaded externally with pale yellow; apex of wing with small dark patch, followed along the outer margin by a narrow yellow border, much lighter than the remainder of the subterminal area; extremity of veins slightly dotted with brown, fringes purplish brown. Secondaries creamy, strongly suffused with smoky brown along costa and outer margin. Beneath, primaries smoky, ochreous along costa and inner margin; secondaries uniform cream colored.

Expanse, 22 mm.

This species possesses the reduced proboscis, the trilobate corne-

ous process, and the thoracic vestiture characteristic of the genus *Azania* Grt. differs from it however in that veins 3 and 4 of secondaries are prominently stalked beyond cell and not from a point at its apex. In this respect it seems to approach nearer to *Acontia*; vein 5 of secondaries is however obsolescent from below middle of cell, so we prefer to place it for the present in *Azania* Grt.

Habitat.—Kerrville, Texas. 1 male. Type, Coll. Barnes.

Euaontia, new genus. (Type *E. semirufa*.)

Palpi upturned, prominent, reaching to a point just beyond frontal process, which is conical and drawn out into two points, placed vertically to each other; tibiae without spines or spurs; vestiture of thorax largely scaly, intermingled with a few hairs; antennae of male ciliate; primaries broadly triangular, with areole, formed by junction of veins R_2 and R_3 , R_4 and R_5 stalked with R_3 , M_1 from below areole, M_2 , M_3 and Cu_1 slightly separated, from around angle of cell.

The position of vein M_2 on secondaries would place this genus, according to Hampson, in the *Acontiinae*; it is easily separated from all allied genera by the conical process with vertically placed apices.

18. Euaontia semirufa, new species.

Male.—Palpi whitish, more or less scaled with dusky and with slightly black tips; front, thorax and patagia white; primaries, basal half white, sparsely sprinkled with fine black dots; on costa a slight dark shade at base, followed by a more prominent blackish mark at one fourth the distance from base; the white basal portion of wing is sharply defined by a dark brown oblique line extending from middle of costa to a point on inner margin about two thirds from base; this line is slightly angled just above cubitus and is followed by a diffuse smoky shade; remainder of wing salmon pink; reniform represented by some whitish scales edged with black just exterior to angle of transverse brown line; subterminal line irregular, composed of grayish white scales, followed by a terminal row of spots, similar in color, and shaded outwardly with dusky brown; towards apex of wing these spots coalesce with subterminal band; fringes ochreous. Secondaries white, broadly shaded with smoky along outer margin, with a series of terminal dark spots; fringes white. Beneath, primaries ochreous, especially towards apex, crossed by a broad suffused smoky band, narrower on costa; secondaries creamy with small discal dot.

Expanse, 24 mm.

Habitat.—Esmeralda Co., Nevada. 1 male. Type, Coll. Barnes.

This species differs markedly from any of the group known to us; the contrast between the white basal portion and salmon colored outer half renders it readily recognizable.

THYATIRIDÆ.

19. *Bombycia fasciata*, new species.

Collar and prothorax ruddy brown; patagia crested, gray, edged with dark brown; posterior portion of thorax gray; abdomen smoky brown; base of legs clothed with rosy hairs, primaries, ground color light purple brown, suffused at base and terminal portion of wing with light whitish green and crossed by a broad median band of same color; the basal green portion of wing is bordered by an indistinct, geminate, outwardly oblique, subbasal line, angled inwardly on submedian fold and filled with light green; at a short distance beyond a geminate t.a. line filled with ruddy brown runs parallel to subbasal line, outer line of the two being broadly black; median area with small round black spot in cell and a wavy black median shade exterior to spot; t.p. line geminate, almost perpendicular, slightly outcurved opposite cell, incurved on submedian fold; inner line deep black, space between ruddy brown; at a point beyond t.p. line equal to distance between subbasal and t.a. lines a perpendicular, lunulate, pale green line, the area beyond this being almost entirely whitish green; below apex of wing a slight black curved line, continued indistinctly as a greenish shade edged with dusky to anal angle, often entirely absent; terminal black line slightly lunulate; fringes rosy gray. Secondaries dark smoky gray, lighter along outer margin, with traces of black subbasal line and lighter median band. Beneath smoky, banded with lighter, costa, apex of wing and fringes rosy; small discal spot on secondaries.

Expanse, 37.5 mm.

Habitat.—Duncans, Vanc. Is. (Oct. 1-7). 2 males, 9 females.
Type, Coll. Barnes.

This species, which is very constant in markings in all specimens before us, we consider distinct from both *improvisa* H. Edw. and *tearlei* Edw. The latter species can at once be separated by its dull gray color and lack of contrasting markings; the median area is scarcely lighter than the remainder of wing and there is no green whatever present; Dyar is evidently in error in making it synonymous with *improvisa* Edw. The green basal area of *improvisa* is more limited than in *fasciata* and of a decided apple green shade; the broad suffusion of greenish in outer portion of wing bordered inwardly by geminate line is almost lacking in *improvisa*, being confined to an apical patch continued as a waved line; the course of the t.a. line also differs in the two species; in *improvisa* it is strongly oblique below costa and well angled inwardly on submedian fold; in *fasciata* it is much less oblique and the angle is not prominent; this latter distinction holds good in 6 specimens of *improvisa* and 11 of *fasciata* compared by us.

20. *Bombycia simicircularis* griseor, new variety.

Female.—Patagia dark, not light gray as in the type forms; primaries more suffused with smoky gray, lines indistinct; white basal patch and apical shade rendered less prominent by dark scaling, former almost obsolete. Secondaries dark buff, with broad marginal border of smoky gray.

Expanse, 40 mm.

Habitat.—Verdi, Nev. (May). 1 female. Type, Coll. Barnes.

This distinct form is probably the southern race of *semicircularis* Grt. We might add that *Cymatophora tema* Stkr. is a synonym of *semicircularis* Grt.; we have compared a specimen with both types and find them identical.

COCHLIDIIDÆ.

21. *Euclea flava*, new species.

Female.—General ground-color of body and wings ochreous yellow; primaries slightly darker in central portion; in basal half of wing an irregular thin white line extending from cubitus inwardly to near inner margin, sharply angled at point of origin and followed by a darkish yellow shade; near the apex of wing a straight white dash extending from costa to vein M_1 ; fringes slightly darker than other portions of wing; secondaries uniform light yellow-ocher; beneath light ocher with costa and outer margin somewhat deeper yellow.

Expanse, 24.5 mm.

This species is most nearly related to *E. dolliana* Dyar, but is at once recognized by its light color and the faintness of the white markings. In outward appearance it greatly resembles *Adoneta* v. *leucosigma* Pack. but differs in venation, possessing all 12 veins.

Habitat.—Babaquivera Mts., Arizona. 1 female. Type, Coll. Barnes.

22. *Natada nigripuncta*, new species.

Male.—Collar reddish ochreous, thorax somewhat lighter, abdomen purplish brown; antennæ and coxæ with white patches at base; primaries silky, light purplish brown at base, much lighter, more ochreous, along costa towards apex; slightly sprinkled with minute black dots and with a black patch just beyond origin of veins 3-5; hind wings uniform purplish brown. Beneath, primaries light brown, whitish along inner margin; secondaries ochreous speckled with black dots.

Expanse, 25 mm.

This species agrees in venation with a specimen of *Sisyroscia textula* Grt. examined by us, having on primaries veins R_2 , R_3 and R_4 .

on long stalk and vein R_5 slightly stalked from just above cell; it possesses however both pairs of spurs on posterior tibiae and would belong, according to Dyar (Proc. U. S. Nat. Mus., 29, 359), in the genus *Natada*. It seems closely related to *N. dognini* Dyar, a species from Columbia.

Habitat.—Prescott, Ariz. 1 male. Type, Coll. Barnes.

PYROMORPHIDÆ.

23. *Tripocris cyanea*, new species.

Entire insect deep metallic blue or green on both sides. Antennæ of male strongly bipectinate, of female slightly so. Length of body 8 mm.

Expanse of wings, 23–25 mm.

This species agrees with *smithsonianus* Clem., the type of the genus *Tripocris*, in lacking vein R_4 of primaries, differs from it however in having veins R_2 and R_3 stalked and not separate. As it possesses the short, untufted abdomen characteristic of the genus we place it here. It is not *lustrans* Beut., as Mr. Beutenmüller has kindly compared it with his type and tells us it is a much smaller insect in every way.

Habitat.—Santa Catalina Mts., Babaquivera Mts., Ariz. (July).

Described from 8 males, 6 females. Types, Coll. Barnes.

24. *Harrisina brillians*, new species.

Entire insect dark metallic blue, often shading into green; abdomen of male tufted laterally and posteriorly; antennæ in both sexes bipectinate. Length of body, 11 mm.

Expanse, 29 mm.

This is the species described by Dyar (Proc. Ent. Soc. Wash., 1901/2, p. 327) under the name of *coracina* Clem. The true *coracina*, however, of which we possess 7 specimens from the type locality, Texas, has no trace of metallic lustre, being simply pure black, just as Clemens stated. *Gingla marteni* Frch. which Dyar is inclined to consider synonymous with *coracina* is entirely different, being broader and shorter winged and possessing a venation approaching that of *Tripocris* but with all veins present on fore-wing. In our species, as in the generic type, *americana*, veins R_2 , R_3 and R_4 of fore-wing are stalked.

Habitat.—Palmerlee, Redington, Yuma, Ariz. (July); Colo. (Bruce)? 7 males, 6 females. Types, Coll. Barnes.

NEW ENGLAND CATERPILLERS, NO. 2. EUBAPHE NIGRICANS REAKIRT.

BY WM. T. M. FORBES,

WORCESTER, MASS.

Eubaphe opella has been described by Dyar in *Psyche*, VIII, p. 119, and in Hampson's "Catalogue of the Lepidoptera Phalaenæ in the British Museum," Vol. III, 193. *E. aurantiaca*, the other known caterpillar of the genus, is described in the Proceedings of the United States National Museum, XXV, p. 374, and must be quite different. *Nigricans* is also entirely different from *opella* in color, to judge merely by the single specimen bred. Of course the variation may be individual, but it would suggest the possibility that *nigricans* is a distinct species from *opella*. In my "Field Tables" *nigricans* will come out in alternative 142, with *Ammalo eglenensis* on superficial characters. The latter has paler (?), feathery hair, and there is not the conspicuous caudal tuft. They should also occur at different seasons, since *nigricans* pupates early in May and evidently hibernates as a caterpillar.

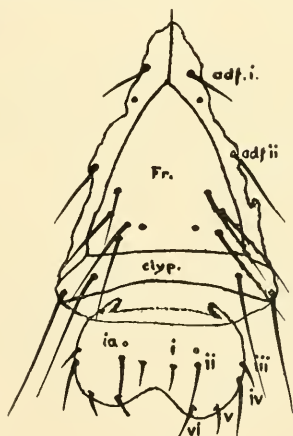


FIG. 1.

Caterpillar (Fig. 1).—Head and body dull pale orange, warts and hair grayish black, entirely without marks. The dense dark hair on the head makes it seem much duller than the body, which is not concealed by its hair. The

hair is deeply serrate, but not at all feathery, short and without very long hairs except at the posterior end where there is quite a mass of long hair extending backward. The lateral hairy ridge notched by Dyar in *opella* is not conspicuous.

Structurally the head agrees with the other Arctiinae, but is decidedly more hairy than most. Epicrania quite hairy over the entire face, though less so, perhaps, than in *Ctenucha*. Front with punctures very far apart, with two or three secondaries, among which the primary is not recognizable. Adfrontals narrow and irregular, without secondaries, the puncture not very high. Clypeus normal, without secondaries. Labrum with ii somewhat higher than i, ia directly over ii but not very far from it. Lower lip normally proportioned for the Arctiidae, with very slender labial palpi; mentum and stipes with dense patches of secondary hair (7 to 10 hairs). The longer hair is serrate, most of the shorter hair smooth. The densely hairy labium separates it from the other arctiid caterpillars known to me.

Compared with specimens of *Lithosia*, *Hyphantria*, *Diacrisia*, *Estigmene*, *Isia*, *Apantesis*, *Euchætias*, *Halesidota* and *Ctenucha*.

The figure shows the front (*Fr*). adfrontals (*adf*), clypeus (*clyp*), and labrum seen from the front. The setae of the labrum are numbered.



OBSERVATIONS ON MEMBRACIDÆ IN THE VICINITY OF ELIZABETH AND NEWARK, N. J.

BY IGNAZ MATAUSCH,

NEWARK, N. J.

1. *Ceresa diceros* Say.

The first specimen, a female, was found by me on July 9, and till August 13 I found both sexes constantly increasing in abundance but from that time on, singly, and mostly females. The last was collected September 12, south of Newark, N. J.

I found 32 eggs in one female collected August 4; 18 eggs in another collected August 6; and 15 in one collected August 13. On this account I venture to believe that the eggs are not deposited all at once but at intervals.

2. *Ceresa albescens* v. D.

July 9, I found a nymph resembling those of *C. taurina*, of yellowish-white fuzzy appearance, due to its being covered with thick hair. I was strongly inclined to believe that I had to deal with a (to me) new species of *Ceresa*, and therefore searched for other specimens in the same spot on *Viburnum*, and on July 13 I succeeded in finding three others. July 15, the first nymph developed to a splendid male, and I found one more of the nymphs. Then one more male and two females developed. I had killed the remaining nymph to make a drawing of it.

The color of the newly matured insect is a splendid green, and only by degrees does it change to the characteristic color associated with this species. I had been unable to get any trace of fully developed insects, in spite of diligent search, till, on September 12, I found a splendid female, south of Newark.

3. *Ceresa bubalus* Fabr.

This species was very plentiful; males from July 21 to August 1. On the latter date I collected the first female, and from that time on, till September 12, both sexes were found, on which date out of 8 specimens, however, only one was male. Till September 30, I collected females only.

4. *Ceresa brevitylus* v. D.

Specimens of this species appeared at about the same time as the first males of *C. bubalus*, and seemed to be rare. I found only 4 specimens in spite of diligent search. Of these one was male, and two females. I could not determine the sex of the fourth specimen, as it was damaged in collecting. The first female was collected July 19, the second July 21, and two other specimens July 22, of which the one saved was a male. They resembled *C. bubalus* so closely that at first I thought them merely sports of that species with dark brown legs.

5. *Ceresa taurina* Fitch.

June 19 I collected the first nymph on a smooth species of *Solidago*, and later two more. The first did not develop, the two others however matured in 5 and 9 days respectively, into handsome males. Nevertheless they died two days afterwards. The adult insects col-

lected from July 6 to 16 were all males. On the latter date I found the first female, and then both sexes occurred till the twenty-second, when the females became more numerous. September 6, I still took them in rather large numbers, but after that time they occurred less and less frequently. Among 27 *Cercsa* specimens collected on September 19, in the region south of Newark, I did not find a single *taurina*.

6. *Cercsa palmeri* v. D.

June 27 I found nymphs of this species quite numerous on *Liquidambar*. These became still more frequent until July 7, when I collected the first mature insect. (There were only males up to June 16.) By July 19 the females were more abundant by far, and I collected varying numbers of both sexes. I also found nymphs as late as July 25. One was also collected by Dr. Lutz, August 2, in the Bronx, New York City, and I took 6 females on the same day. I examined these for eggs but found them all empty. From then till September 19, only females were taken.

7. *Cercsa borealis* Fairm.

The first were found July 21 and 22—6 females and 5 males. August 1 I found 2 more males and 3 females. They were very plentiful from September 6 to 19, when the last lot—all females—were collected.

8. *Stictoccephala lutea* Walk.

I found these to be plentiful as early as June 13 on a smooth species of *Solidago*. I collected several, and also looked for nymphs and nymph-moult. I observed but one specimen, however, likely to have been the nymph of *lutea*. It was perched by the side of an adult insect, but on my approach, both dropped into the grass and escaped, so I obtained only a fleeting glance of it. This nymph was grayish-blue in color with two long, spreading, anal projections which however are present in all nymphs, but are shorter. The adult insect is usually found under the crown of the plant, rarely within it. When approached it has the habit of trying to hide by darting to the side of the stem opposite the observer. I have noticed the same habit in some beetles and young grasshoppers. June 13 I found both sexes in equal numbers, but took males only between this date and the twenty-seventh. On the latter date, however, I found

3 females, one of which I kept alive until July 2, but as a rule they died within 2 or 3 days. I collected all the material alive, so as to get the eggs, and to watch the mating of the sexes if possible. I was disappointed in the latter, but eggs were obtained from several females. I observed that they deposited the eggs on the lower part of the stem, either singly or in groups of 2 or 3. These were imbedded for about half their length in crevices of the bark. The eggs are about 1 mm. long, somewhat bent, the lower half somewhat more acutely so, than the upper portion, which is furnished with a rough skin-like cap ending in a point on the convex side, and so placed that it more or less completely fills out the crevice of the bark, thus protecting the egg. On examining a lot of females for eggs, I was surprised to find only 6 in each specimen, except in one which had 5. It is hardly probable that this represents the full number of eggs, for it is very likely that they are laid as I suspected in the case of *Ceresa diceros*. I could not determine from the specimens in captivity the entire number of eggs deposited by one female, and so I have reserved this question for further observation.

9. *Acutalis semicrema* Say.

The first insects of this species were found July 19, under *Sambucus* on *Solidago*, both sexes in equal numbers. July 22 I collected 2 nymphs, which at first sight seemed to be about half-grown *Ceresa palmeri*. But the pronotum does not rise vertically above the head as in that species, but is rounded off. It differs also in the closely appressed dorsal projections of its segments, which are totally lacking in the full-grown nymph of *C. palmeri*. One of these nymphs developed into an adult female the following morning, but I had to kill the other to make a drawing. The last examples of this species were collected by me as August 1. At this time the females were the more numerous. Mr. E. A. Bischoff also collected 3 females August 12, at Irvington, N. J.

10. *Micrutalis calva* Say.

September 26 I collected one female of this species at Irvington, N. J., on a *Robinia* bush, growing in a patch of *Solidago*.

11. *Carynota mera* Say.

June 20 I found the first nymph on *Juglans*. The next morning it moulted, but died shortly afterwards. July 3 I found the first

mature female and more nymphs. July 4 and 5 I found one female on each day, and on the sixth I collected many, both females and nymphs. I succeeded in bringing five of the nymphs to maturity, and all turned out to be females. One female adult when collected was examined for eggs, but there were none. From that time I collected females singly till July 19. Three of these I examined for eggs, but found none. September 19 I collected the last insect of this species at Newark, N. J. All were females. The only male obtained this season was collected by Mr. R. P. Dow, at Flatbush, L. I.

12. *Thelia bimaculata* Fabr.

August 1 Mr. Bischoff collected five specimens at Rahway, N. J., among them one with retarded development of the sexual organs, and intermediate between the male and female in size. A slight variation of form and color in the prothorax of this specimen indicates that the incomplete development of the sexual organs may also affect other parts of the body. Mr. Bischoff also found some nymphs but did not keep them. I found several adults and nymphs, September 8, at Cold Spring Harbor, L. I.

13. *Telamona* species? (near *heliria*).

This insect was found on *Liquidambar*, as was the case with two specimens collected last year in the Bronx, N. Y. City. July 6 I took one male, and July 13 one female. July 24 I collected one female and three males, and the next day another male. Besides these, on July 24 I found two nymphs, one of which, from its form, size and the locality could possibly be the nymph of this species. However, I did not succeed in bringing it to maturity, in spite of all my efforts. I noticed that it would not nourish itself from the young shoot where I placed it but insisted on trying to feed at its junction with the old last year's shoot, where the sap was richer and most plentiful.

14. *Telamona* species?

Small, not yet identified specimens were found as follows: July 5-8 on *Liquidambar*. Of these three were females and one a male. The other four were sexually undeveloped. July 15 I had twenty-two specimens in all, eleven of them sexually abnormal. From that time on, single captures of males and females were made, until July 25, when the last was taken. During this period, however, I collected

some nymphs which were perhaps of the same species. Nevertheless, I could not be sure, for in spite of all my care I could not raise any to maturity, as they required food for a longer time than it could be obtained in abundance.

15. *Telamona ampelopsidis* Harris.

Altogether I found five specimens of this species on *Ampelopsis*, July 3 to 15. Of these one was male, two were females, one had imperfectly developed genitalia, while the other seemed to be in the same condition but was damaged and I could not make sure.

16. *Telamona* species? (labeled "near *reclivata*" by Mr. Van Duzee).

I found one female, September 6 on *Quercus*, and another September 19. Both were darker in color, but otherwise corresponded with this species.

17. *Cyrtolobus* species?

July 3 to 5 I found eight females on *Quercus alba*. I examined one for eggs, and found eight. Because of this small number, and because I found no males, I concluded that it was rather late in the season for this insect.

18. *Ophiderma flavocephala* Gody.

August 1 Mr. Bischoff collected one specimen at Rahway, N. J., and also one identified as *O. obscura* by Van Duzee. The latter species is not mentioned in his "Studies on North American Membracidae," but was probably described later.

19. *Vanduzia arcuata* Say.

Mr. Bischoff collected one male and two females at Rahway, N. J., and September 8 I found a number of them at Cold Spring Harbor, L. I., with *Thelia bimaculata*. They were on *Robinia* but escaped. At Elizabeth and Neward I found none.

20. *Publilia concava* Say.

This insect was not found here, in spite of the variety of species of *Salidago* which occur. Mr. W. Reiff, however, on September 27 collected a great number of adults of both sexes and some nymphs at Forest Hills, Boston, Mass., and was kind enough to send them to me.

21. Campylenchia curvata Fabr.

June 13 I found a small number of nymphs on *Solidago*. The first adult developed on the twenty-fifth, after having moulted at least twice. This seems clear, as it had apparently moulted at least once before capture as I judged from the number of moulted skins. After obtaining these specimens, I observed only nymphs singly and now and then. The first adult insect (a male) was caught June 26. The next day I obtained a male and female, and after that both sexes in varying numbers till August 1, when the proportion of females had noticeably increased. September 19 I took two females near Newark, and September 26 Mr. Bischoff obtained another at Irvington, N. J.

22. Euchenopa binotata Say.

July 3 the first specimens were taken. This species was, as a rule, very scarce, only single specimens being taken, except on July 6, when I found a *Viburnum* tree with a large number of both sexes and also many nymph-moult. Among the specimens was one freshly matured insect. After this the species was rarely found until September 19, when I obtained my last specimen (a female) at Newark. In August I received a number of insects, mostly females, of remarkable size and shape, and some still living, from the Field Museum of Natural History, Chicago, through the kindness of Dr. B. E. Dahlgren. With them were some very fine specimens of twigs covered with eggs.

23. Microcentrus caryæ Fitch.

I found only one specimen, a female and without horns, on *Juglans* at Newark, September 19. Mr. Bischoff, however, has given me six splendid specimens of this species collected by him at Lakehurst, N. J. Four of these were horned females and two were males. The shape of the horns on the latter is so much like that in *Centruroides perditæ* Am. & Serv. that I am beginning to doubt whether *C. perditæ* and *M. caryæ* may not be merely local variations. This, however, cannot be exactly determined until more extensive studies are made, under favorable conditions. Mr. R. P. Dow also collected one male similar to the above at Pinelawn, L. I., in June of this year.

Microcentrus caryæ appears in a great variety of forms and size according to my observations of last year. The first insects of that genus which I received were collected by Mr. W. T. Davis and Mr. E. A. Bischoff in Lakehurst, N. J. They were all females and had

rather strongly developed horns. Later Mr. Davis collected one male of the same form. Another lot of both sexes (two males, three females) was received from Mr. Davis from the same locality, smaller in size and with less developed prothoracic horns. I collected three specimens on Staten Island with still less developed prothorax and a similar lot in Queens, L. I., on swamp oak and walnut, all males. At Lake Hopatcong, N. J., I found fourteen on a walnut having the horns only slightly indicated. Both sexes were represented. One, however, from the same tree had rather strongly developed horns. Finally I got one female from Hempstead, L. I., collected by Mr. Ch. Olsen, with highly developed, wide ear-like horns, showing how extreme the variations may be. In size they vary from 6.5 to 9.5 mm.

SMILIA CAMELUS FABRICIUS AND SOME OF ITS VARIATIONS.

BY IGNAZ MATAUSCH,

NEWARK, N. J.

Through the kind assistance of some of my fellow entomologists I have been able to make observations on the variations of *Smilia camelus* females. The males seem to be more constant, but the females vary somewhat in size, and to a remarkable extent in coloration and markings.

Without doubt, as Mr. Van Duzee says, *guttata* Fitch and *viridis* Goding are only varieties of *camelus*, and I think only of the females. The first insects I received from Mr. G. P. Engelhardt and M. W. Beutenmüller, and one from Florida, were typical *camelus* females. Mr. F. E. Watson collected on June 25, 1907, in New Foundland, N. Y., two females of *guttata* having the transverse band formed by a row of more or less heavy markings but otherwise they are the same in color and form as *camelus*. Professor Filippo Silvestri collected, besides two males, one female intermediate in size between male and female of the dark form of the male. At the meeting of the New York Entomological Society on November 17, 1908, I exhibited them

in enlarged water color paintings and named the female *silvestrii* (as it could be taken for a male of a large size), and described it as follows:

***Smilia camelus* Fabr. var. *silvestrii*, new variety.**

Differs from *S. camelus* by the smaller size but has the same dark brown color as the male. It has the same shape of dorsal crest as *camelus*, which is highest anteriorly, sloping to the apex, before which the contour is slightly simulated. Pronotum toward the base lighter, becoming very dark posteriorly, starting in front of the margin of the transverse yellow band. Head and front part of the pronotum with testaceous markings, very dark, punctured. Tegmina hyaline, with the venation reddish brown, very dark at the apex, which is rather broadly and deeply infuscated. Legs testaceous.

Collected with two males by Professor Silvestri in the Catskill Mountains, Otis Summit, on June 22, 1908. The males were of the common size, but the hyaline vitta had more or less the color of the transverse band. At the American Museum of Natural History I have seen one male, with the infuscated part of the tegmina very pale. Professor J. B. Smith was kind enough to let me have two females collected on July 4 and 7 at Lakehurst, N. J. These have the transverse yellow band quite strongly mixed with green. From the Ramapo Mountains, N. Y., and collected June 12, I received from Mr. C. Schaeffer one female of the same color as the Florida specimens, only in size somewhat smaller. Mr. Engelhardt collected on June 26 last year at Rockaway Beach, L. I., two males of *camelus*. During the same season in July Mr. Watson collected at Greenwood Lake, N. J., a number of *camelus*, of which I received one male of common size and form, but four females of different varieties. One of these is somewhat darker and has the transverse band of *guttata* in very reduced markings; another somewhat lighter has the markings only slightly indicated and two fail to show the least indication of these markings and have the prothorax of a uniform brown, although in form they resemble *camelus*.

A LIST OF LABRADOR COLEOPTERA.

BY JOHN D. SHERMAN, JR.

BROOKLYN, N. Y.

It is an eminently proper introduction to the following list of Labrador beetles to express, as best I may, the great obligation I am under to Dr. Wilfred T. Grenfell, whose enthusiastic help and suggestions put me into communication with exactly the right men to collect for me, when I set out, a few years ago, to obtain Dytiscidæ from this region. The fact of my acquaintance with Dr. Grenfell and his own personal appeals to my correspondents in my behalf, aroused an interest and resulted in efforts successful to an extent far beyond my greatest hopes. But the willing coöperation of my Labrador friends will be readily understood by those whose privilege it is to know this wonderful man with his great love for his fellowmen—a privilege which has been one of the great joys of my own life.

My own Labrador material consists of about ten thousand specimens of beetles, collected by seven residents of Labrador selected by Dr. Grenfell, none of them entomologists, but some of them very successful collectors nevertheless. The localities represented are West St. Modest, Red Bay and Cape Charles, in the Straits of Belle Isle; Hopedale and Nain further up the coast; Nachvak in the far north; and Fort Chimo on Ungava Bay. About one hundred species are represented in my material, and as the attention of my correspondents up to the present time has been principally directed toward collecting *water* beetles, it is likely that several additional species will be found.

The only published list of Labrador beetles with which I am familiar is that of Dr. Packard, published in its complete form in the *Canadian Entomologist* for August, 1888, and again in Dr. Packard's fascinating book, "The Labrador Coast" (1891). This list included sixty-three species, mostly collected by Dr. Packard himself. The collection is now contained in the entomological collections of the Museum of Comparative Zoölogy at Cambridge, Mass. There is also a brief list, by the late Dr. James Fletcher, of thirteen species of

beetles collected in the interior of the Labrador peninsula in 1894 by A. P. Low.¹ I have combined these lists with my own.

With the very kind permission of the authorities of the U. S. National Museum, Dr. L. O. Howard and Mr. E. A. Schwarz, I am also able to include Mr. Schwarz's manuscript list of the fifty-nine species collected by L. M. Turner in 1883, in the Ungava Bay region in northern Labrador. Some reference has been made to this collection by the late Roland Hayward in his "Studies in Amara." Mr. Schwarz has very recently gone over his list for me, and has also examined a number of the species received by me.

Including these other lists I am now able to present a list of 166 species, of which 46 are Carabidæ and 34 are Dytiscidæ. In regard to my own material, I wish to say that my good friend, Mr. Frederick Blanchard, has examined and determined a large percentage of the species, supplying at the same time copious information as to several of them, so that to a great extent it is Mr. Blanchard's list rather than my own. The late Roland Hayward examined nearly all the species of Carabidæ, Mr. C. H. Roberts has carefully studied the Dytiscidæ, and, as before stated, Mr. Schwarz has studied several of my species.

I have sought to indicate the geographical distribution of the various species to some extent, including particularly records of occurrences in Greenland, the White Mountains of New Hampshire, Alaska, Newfoundland, the Hudson Bay region. Some of the published lists consulted for this purpose are:

1. Coleoptera Groenlandica, by Wm. Lundbeck. (Videnskabalige Meddelelser, 1896.) This list enumerates 33 species, of which 9 occur in Labrador. One or two other species not listed by Lundbeck occur both in Greenland and Labrador.

2. List of the Coleoptera of Mt. Washington, by Fred. C. Bowditch, Psyche, June, 1896. This list embraced the list of E. P. Austin and other previous lists.

3. Lists of Mt. Washington insects by Mrs. Slosson, published at various times in Entomological News.

4. List of Alaska Coleoptera, by John Hamilton in Transactions American Entomological Society, Vol. XXI, January, 1894.

¹ Geological Survey of Canada, Part L, Annual Report, Vol. VIII, Ottawa, 1896.

5. Coleoptera of the Harriman Alaska Expedition, by E. A. Schwarz.

6. Le Conte's lists of Coleoptera taken in the Hudson Bay and Lake Superior regions by Dr. Bell and others, summarized by W. H. Harrington in *Canadian Entomologist*, 1890, p. 135.

7. Coleoptera of Michigan, by E. A. Schwarz.

8. List of Coleoptera common to North America, Europe, and Asia, by John Hamilton in *Transactions American Entomological Society*, Vol. XVI, March, 1889.

In addition to these printed lists, Mr. Blanchard's letters have given numerous additional geographical references, and Mr. Percy G. Bolster, of Boston, has kindly sent me a copy of his unpublished list of about 170 species collected in Newfoundland in 1905 and 1907 and identified for him by Mr. Blanchard. Mr. Charles W. Leng's unpublished list of Newfoundland beetles has also been at my disposal.

The records herein cited show that 12 of the 166 Labrador species are known to occur in Greenland; 93 species are known to occur on Mt. Washington or elsewhere in the White Mountains of New Hampshire; 65 species are known from Alaska; 79 species from the Hudson Bay and Lake Superior regions; only 35 species are common to Labrador and Newfoundland; 48 species occur also in Europe and Asia, while three or four may be termed cosmopolitan.

In referring to the matter of geographical distribution, particularly of these northern species, one recalls Mr. Schwarz's interesting remarks on the circumpolar fauna,¹ especially the following: "The mountain ranges in America run in the direction from north to south, and the colonies of circumpolar insects upon their summits have thus been able to preserve their connection and specific identity with the arctic forms; whereas in Europe, where the mountain ranges run from east to west, the alpine colonies have generally undergone changes and, by isolation, lost their specific identity with the arctic species. There is, therefore, in the Old World an abundance of distinct alpine forms, none of which are identical with North American species; while we, on our high mountains, have but few, if any, alpine, but more arctic forms."

In the absence of other authority for the Labrador localities cited

¹ *Proceedings Washington Entomological Society*, Vol. I, No. 4.

in my list, it is to be understood that the references relate to specimens which I have received.

1. ***Carabus chamissonis* Fisch.**

Domino Harbor: Okkak (Packard); Ungava Bay (Turner: Schwarz list); West St. Modest; Hopedale. Greenland; Alaska (Unalashka and Kadjak) (Hamilton); Cape Blossom, within arctic circle (Fall). Mt. Washington, alpine (Bowditch). Oxford House, Nelson River House, Hudson Bay region (R. Bell). All of my Labrador specimens are entirely black.

2. ***Elaphrus obliteratus* Mannh.** (= *obscurior* Kirby.)

One specimen, West St. Modest. Kadjak, Alaska (Hamilton); "A single specimen, taken in Latitude 65°" (Kirby). Mr. Blanchard comments: "Truly a prize find. I suppose there are more where this came from if we were only there to hunt them up."

3. ***Loricera cærulescens* Linn.**

West St. Modest. Mt. Washington, N. H. (Mrs. Slosson); Kenai, Alaska; California westward to Lake Superior, Magdalen Islands, Nova Scotia; Kamtschatka, Siberia, central and northern Europe (Hamilton); coast plain southwestern Newfoundland (Bolster).

4. ***Notiophilus aquaticus* Linn.** (= *hardyi* Putz.)

West St. Modest. Summit of Mt. Washington, N. H. (Bowditch); Oxford House, Hudson Bay (R. Bell); Behring Strait, Alaska; all northern Asia, northern and central Europe (Hamilton). Fall mentions also the following localities: Bay of Islands, Newfoundland; Colorado (5,000–10,000 feet), Beulah, New Mexico (8,000 feet), Las Vegas, New Mexico (11,000 feet), Kalispell, Mont.; a colony found by Frederick Blanchard in February, 1870, on a frozen pool in a grassy field at Tyngsboro, Mass. Coast plain, southwestern Newfoundland (Bolster).

5. ***Notiophilus borealis* Harr.**

The specimen from Domino Harbor, Labrador, listed by Packard as *sibiricus* Mots. is *borealis* Harr. Mr. Blanchard examined the specimen at Cambridge. *Borealis* occurs above tree line on Mt. Washington and Mt. Lafayette in the White Mountains (Blanchard), and on Mt. Marcy in the Adirondacks (Leng); also at Nome, Alaska (Dr. Blaisdell).

6. *Notiophilus semistriatus* Say.

Ungava Bay (Turner: Schwarz list). Mr. Schwarz writes, April, 1910: "The *Notiophilus* has in the meantime been determined according to Fall's paper as *semistriatus* Say." Fall cites Massachusetts, Staten Island, Pennsylvania, New Jersey, Veta Pass, Colorado, Breckinridge, Colorado (9,600–10,000 feet), and Cloudcroft, New Mexico.

7. *Nebria sahlbergi* Fisch.

Sloop Harbor; Cape Chidley (Packard); interior of Labrador (Low: Fletcher list); West St. Modest, common. Mt. Washington, N. H. (Bowditch); Kenai and Sitkha, Alaska; Queen Charlotte Island, Vancouver, Lake Superior, Quebec (Hamilton); Nelson River House, Hudson Bay (R. Bell); Newfoundland: southwestern coast plain; Grand Codroy River, and Humber River (Bolster).

8. *Pelophila rudis* Lec.

9. *Pelophila ulkei* Horn.

Both forms at West St. Modest. One specimen of *rudis* from Cape Charles. Six specimens of *ulkei* from Red Bay. Fletcher lists *ulkei* from the interior; Schwarz lists it from Ungava Bay; Percy Bolster took one specimen on the Humber River, Newfoundland. *Rudis*, the form with the red markings, is apparently much less common than the entirely black *ulkei*. Both species were described from the Hudson Bay region and both were taken by Dr. Bell.

Dr. Van Dyke wrote me some time ago as follows: "The *Pelophilas* are mere color varieties of the same thing; *ulkei* and *rudis* were based at the most upon very small series of boreal beetles which we know vary much, not only in color, but also in physical characters." And again, after his trip to Alaska: "The series of *Pelophila* from Labrador furnished several examples of what I was looking for, that is specimens with the punctures in the striae well indicated. This proves to me that they are simply offshoots of *Pelophila Eschscholtzii* Mannh., and really should not be more than subspecies. We will need, however, to get material from more intermediate regions, before passing final judgment. The Labrador specimens are all somewhat smaller than mine from Alaska."

10. *Bembidium longulum* Lec.

West St. Modest; one specimen sent to Hayward. Occurs in Lake Superior region.

11. **Bembidium grapei** Gyll. (= *picipes* Mannh. = *nitens* Lec.)

West St. Modest, a few. Greenland (Schiodte, Lundbeck); Mt. Washington, N. H., alpine (Bowditch); Kadjak, interior of Kenai, Fort Simpson, Michigan, New Mexico, northern Siberia and Europe (Hamilton); Bay of Islands, Newfoundland (Bolster).

12. **Bembidium oblongulum** Mannh.

West St. Modest. Mt. Washington, N. H. (Bowditch); Sitkha, Queen Charlotte Island, Massachusetts (Hamilton); Newfoundland: coast plain, and Bay of Islands (Bolster).

13. **Bembidium** sp.

Ungava Bay (Turner: Schwarz list).

14. **Patrobus septentrionis** Dej.

West St. Modest, Red Bay, Cape Charles, rather common. Packard cites Belles Amours and Cape Chidley for variety *hyperboreus* Dej. and Square Island for variety *tenuis* Lec. The species is considered to include numerous forms and varieties in arctic Europe, Siberia and North America. (See Hamilton's Alaska list.) Occurs in Alaska, Hudson Bay region, Newfoundland, Mt. Washington, N. H. (Bowditch); Greenland (Schiodte, Lundbeck).

15. **Trechus rubens** Fabr. (= *micans* Lec.)

Belles Amours (Packard); West St. Modest. Newfoundland: coast plain, Grand Codroy River (Bolster); Mt. Washington, N. H. (Bowditch); Lake Superior; also northern Europe. Dr. Van Dyke wrote me: "The *Trechus* sent from Labrador is exactly like my specimens of *chalybaeus* Dej. from Alaska, Mt. Rainier, and the high Sierras. The Colorado forms are slightly different. The only forms which answered to the description of *rubens* that I have ever seen were in the Leconte collection, and even these, I am inclined to think, are not far off from *chalybaeus*."

16. **Pterostichus punctatissimus** Randall.

Ungava Bay (Turner: Schwarz list); West St. Modest. Mt. Washington, N. H. (Bowditch); Oxford House, Hudson Bay (R. Bell); Newfoundland: coast plain, Bay of Islands (Bolster); Siberia (Hamilton).

17. **Pterostichus orinomum** Leach.

Muscatina, Gulf of St. Lawrence (Packard).

18. *Pterostichus luczotii* Dej.

Blanc Sablon (Packard); West St. Modest, very common. Mt. Washington, N. H. (Bowditch); Alaska, Hudson Bay, Lake Superior (Hamilton). Newfoundland: coast plain, Bay of Islands, Humber River: common (Bolster).

19. *Pterostichus (Pseudocryobius) mandibularis* Kirby.

Ungava Bay (Turner: Schwarz list); West St. Modest, Hopedale, common. Mt. Washington, N. H. (Bowditch); below tree line in White Mountains, under bark of logs, etc.; Oxford House, Hudson Bay (R. Bell); Kenai, Alaska; Fort Simpson, Vermont, Massachusetts; also arctic Siberia (Hamilton).

20. *Pterostichus hudsonicus* Lec.

Stupart's Bay (R. Bell, Packard). Mt. Washington, N. H., common. alpine (Bowditch); Alaska; Hudson Bay (Hamilton). A species near this was received from Cape Nome and Cape Blossom within the Arctic circle (Fall, *Entomological News*, May, 1900).

21. *Pterostichus* sp.

An undetermined species of *Pterostichus* is mentioned by Dr. Fletcher in his list of species from the interior of Labrador.

22. *Amara (Cyrtonotus) cylindrica* Lec.

West St. Modest, Hopedale, Fort Chimo. One of the commonest Labrador species. Collected by me above tree line in White Mountains. Hayward mentions also the following localities: Newfoundland, Magdalen Islands, Winnipeg, Slave Lake, Hudson Bay, Colorado (8,000-10,000 feet).

23. *Amara (Cyrtonotus) hudsonica* Hayward.

Described by Hayward from three males in Collection U. S. National Museum. Ungava Bay (Turner: Schwarz list).

24. *Amara (Cyrtonotus) brunnipennis* Dej. (= *hyperborea* Dej. as understood in America; = *obtusa* Lec.)

Cape Digges, Cape Chidley, Stupart's Bay (R. Bell, Packard); West St. Modest, Hopedale, Fort Chimo. The *Amara pennis* Dej. mentioned by Packard from Caribou Island must be this species. Mt. Washington, N. H. (Bowditch); Hayward mentions also Mt. Katahdin, Me., Mt. Mansfield, Vt., Alaska, Hudson Bay, Colorado (high altitudes).

25. *Amara (Cyrtonotus) elongata* Lec. (Probably the true *hyperborea* Dej., according to Hayward.)

West St. Modest, Cape Charles, Hopedale; Ungava Bay (Turner: Schwarz list). Nelson River House, Hudson Bay (R. Bell); Lake Superior and Fort Simpson (Hayward).

26. *Amara (Cyrtonotus) hæmatopa* Dej. (= *Stereocerus similis* Kirby.)

Caribou Island, Sloop Harbor, Hopedale, Okkak (Packard); Ungava Bay (Turner: Schwarz list); West St. Modest, Red Bay, Hopedale. Mt. Washington, N. H. (Bowditch); Alaska, northwest Canada, Mt. Katahdin, Me., Green Mountains, Vt. (Hayward); Kowak River, Alaska, within Arctic circle (Fall); Nelson River House, Hudson Bay (R. Bell).

27. *Amara (Bradytus) glacialis* Mannh.

Ungava Bay (Turner: Schwarz list); Hopedale, Nain. Kenai, Alaska, and on the mainland; also Kamtschatka (Hamilton).

28. *Amara (Bradytus) Schwarzii* Hayward. (= *septentrionalis* Lec.)

West St. Modest, one specimen. Described from Lake Superior.

29. *Amara (Celia) erratica* Sturm.

West St. Modest, two or three. Mt. Washington, N. H. (Bowditch). Hamilton gives following distribution: Atkha, Kadjak, Kenai, Alaska; Queen Charlotte Island; British Columbia to Hudson Bay, southward to Vermont and Lake Superior, through Rocky Mountains to New Mexico; arctic Siberia southward to Mongolia and Turkestan; northern and middle Europe.

30. *Amara (Celia) interstitialis* Dej.

Ungava Bay (Turner: Schwarz list); Hopedale, one or two specimens. Hamilton gives Alaska, British Columbia, Washington, Oregon, California, Fort Simpson, eastward to Hudson Bay and Nova Scotia, southward through the Alleghanies to Pennsylvania, and through the Rocky Mountains to New Mexico; arctic Siberia, Kamtschatka, arctic Europe, Turkestan.

31. *Amara (Celia) remotestriata* Dej.

Ungava Bay (Turner: Schwarz list); Nain, one or two examples. Hamilton cites Alaska to Hudson Bay, Montana to New Mexico, Wisconsin to New York, New Jersey, Iowa.

32. *Amara (Celia) sp.*

Ungava Bay (Turner: Schwarz list).

33. *Calathus ingratus* Dej.

Whole coast (Packard); West St. Modest, Nain, common. Mt. Washington, N. H. (Bowditch); Hamilton quotes Alaska, Lake Superior, Colorado, New Mexico; Newfoundland: coast plain and Bay of Islands (Bolster).

34. *Calathus advena* Lec. (= *mollis* Motsch.)

West St. Modest, two specimens. Mt. Washington, N. H. (Bowditch); Alaska, Lake Superior, Vermont, Maine (Hamilton).

35. *Platynus maurus* Motsch. (= *angusticollis* Dej. as erroneously determined by Kirby.)

West St. Modest, two or three. Mt. Washington, N. H. (Bowditch); Alaska, Hudson Bay, Newfoundland (Hamilton).

36. *Platynus sinuatus* Dej.

Belles Amours, Straits Belle Isle (Packard). Mt. Washington, N. H. (Bowditch); Hudson Bay, Lake Superior, Newfoundland: coast, plain and tableland, Grand Codroy River, Bay of Islands (Bolster).

37. *Platynus deceptivus* Lec. ?

Ungava Bay (Turner: Schwarz list).

38. *Platynus 4-punctatus* Kirby.

West St. Modest, one. Mt. Washington, N. H. (Bowditch); Alaska, boreal regions of British Columbia to Hudson Bay, southward to New York and western Pennsylvania, Rocky Mountains to New Mexico; Siberia, boreal and alpine Europe (Hamilton).

39. *Platynus sordens* Kirby.

West St. Modest, one. Thunder Bay to Lake of the Woods, west of Lake Superior (R. Bell).

40. *Lebia grandis* Hentz.

Ungava Bay (Turner: Schwarz list).

41. *Cymindis unicolor* Kirby.

Ungava Bay (Turner: Schwarz list); West St. Modest, two specimens. Mt. Washington, N. H. (Bowditch); Hudson Bay, New England States, Argentine Pass, Colorado (13,000 feet).

42. *Harpalus megacephalus* Lec.

Ungava Bay (Turner: Schwarz list).

43. *Harpalus fulvilabris* Mannh.

West St. Modest, two. Kadjak, Alaska, and on the Saskatchewan (Hamilton). Lake Superior. Newfoundland (Bolster).

44. *Harpalus herbivagus* Say var. *proximus* Lec.

Square Island (Packard). I received several examples of a *Harpalus* pronounced "*near herbiragus* Say" by Blanchard, and "*near pleuriticus* Kirby" by Hayward. All my specimens came from West St. Modest, and Bolster took the same species in Newfoundland. *Harpalus pleuriticus* Kirby is recorded from Mt. Washington, N. H. (Bowditch), Hudson Bay, Lake Superior, New York and elsewhere.

45. *Trichocellus* (*Bradycellus*) *cognatus* Gyll.

West St. Modest, a dozen or so. Greenland (Schiodte, Lundbeck); Mt. Washington, N. H. (Bowditch); Alaska to Nova Scotia, Colorado, California, Arctic Siberia, northern and central Europe (Hamilton); Newfoundland: coast plain (Bolster).

46. *Trichocellus* sp.

Ungava (Turner: Schwarz list). Mr. Schwarz writes: "Radically different from *cognatus* Gyll. though also a *Trichocellus*; being unfamiliar, however, with the Siberian literature, I am unwilling to attach a specific name to it."

47. *Haliplus cribrarius* Lec.

West St. Modest, one specimen. Mt. Washington, N. H., Lakes of Clouds (5,000 feet), common (Bowditch); Hudson Bay, Lake Superior. Newfoundland: coast plain (Bolster); Bay of Islands (Leng).

48. *Deronectes griseostriatus* DeG. (= *catascopium* Say.)

Square Island, Dumplin Harbor (Packard); West St. Modest, Cape Charles, Red Bay, Nachvak. Very common; one bottle from West St. Modest contained over 1,000 specimens. Ungava Bay (Turner: Schwarz list). Mt. Washington, N. H. (Bowditch list). Very abundant Starr Lake, N. H. (4,800 feet). Hamilton gives Alaska to Labrador, southward to Pennsylvania, Colorado and California: Arctic Siberia, alpine and northern Europe, Lapland.

The form *catascopium* Say, found in the vicinity of New York, Chicago, etc., differs somewhat from the northern form and is seldom found in quantities.

49. *Hydroporus longicornis* Sharp.

Stupart's Bay (R. Bell: Packard). Finland, Scotland, Wales, Savoy (Sharp).

50. *Hydroporus perplexus* Sharp.

Stupart's Bay (R. Bell: Packard). Allied to the following species. Described from California.

51. *Hydroporus tenebrosus* Lec.

Caribou Island (Packard); Ungava Bay (Turner: Schwarz list). The three Turner specimens are very large and reddish. Described from Lake Superior. I take this species at Hermit Lake (3,700 feet) on Mt. Washington, N. H., also at Randolph, N. H. (1,300 feet). Tyngsboro, Mass. (Blanchard).

52. *Hydroporus morio* Sharp. (= *articeps* Crotch = *melanocephalus* Marsh., Steph. as ordinarily referred to.)

Ungava Bay (Turner: Schwarz list); West St. Modest, Red Bay, Hopedale, Nachvak; common. Greenland (Lundbeck); Mt. Washington, N. H. (Bowditch). I have taken this species on Mt. Washington both at Hermit Lake (3,700 feet), below the tree line, and at the Lakes of Clouds (5,000 feet). Europe; Siberia; Finland 69° north; Scotland (Sharp).

53. *Hydroporus puberulus* Lec.

Sloop Harbor, Dumplin Harbor (Packard). Described from Lake Superior.

54. *Hydroporus humeralis* Aubé.

West St. Modest, three specimens. Alaska, British Columbia.

55. *Hydroporus arcticus* Thomson.

Several specimens from Nachvak; one from Hopedale; identical with my Lapland examples received from René Oberthür. Arctic Siberia 69° north (Sahlberg).

56. *Cœlambus unguicularis* Crotch.

Ungava Bay (Turner: Schwarz list). Described from British Columbia.

57. *Ilybius subæneus* Er.

Ungava Bay (Turner: Schwarz list). Red Bay, common: West St. Modest, a few. Europe; Finland to 69° north, France, Germany:

Hudson Bay (Sharp); Newfoundland: Bay of Islands, Little Codroy River (Bolster).

58. *Ilybius pleuriticus* Lec.

West St. Modest, uncommon. Hermit Lake, Mt. Washington, N. H. (3,700 feet). Newfoundland, Bay of Islands (Leng, Bolster). Described from Lake Superior. Occurs rarely in northeastern states.

59. *Ilybius angustior* Gyll. (= *Colymbetes picipes* Kirby.)

Caribou Island, Strawberry Harbor (Packard); Red Bay, very common; West St. Modest. Mt. Washington, N. H., one in Lakes of Clouds (Bowditch), Kenai, Alaska; Lake Superior, Kansas, Siberia, northern Europe, Lapland (Hamilton).

60. *Ilybius discedens* Sharp.

West St. Modest, four. Mt. Washington, N. H., one specimen in Lake of Clouds (Blanchard); Newfoundland, Bay of Islands (Leng). Described from Hudson Bay.

61. *Agabus seriatus* Say. (= *parallelus* Lec.)

Square Island (Packard). I took several on Mt. Washington carriage road, about 2,500 feet. Widely distributed in eastern United States. Common in Newfoundland, at edge of tableland of Little Codroy River, 700 feet (Bolster). Summit of Mt. Washington, July (Bowditch).

62. *Agabus semipunctatus* Kirby.

Caribou Island (Packard). I have taken this species at Lakes of Clouds Mt. Washington, N. H. (5,000 feet), Storm Lake, N. H. (4,900 feet), Randolph, N. H. (1,300 feet), Peekskill, N. Y. I also have specimens from Antigonish, Nova Scotia; Ottawa, Ontario (Harrington); Lake Forest, Illinois (Needham); Brookline, Massachusetts (Bowditch). Hamilton gives Kenai, Alaska, Lake Superior, Missouri.

63. *Agabus æneolus* Crotch. (= *punctulatus* Aubé.)

Caribou Island (Packard). Mt. Washington, N. H., Lakes of Clouds July (Bowditch); September (Sherman); West Hebron, N. Y. (Leng); Colorado 8,000 feet (Bowditch); Corvallis, Oregon (Woodcock); Lake Superior (LeConte); Pennsylvania, Newfoundland (Crotch).

64. *Agabus congener* Payk.

Very common. West St. Modest, Red Bay, Cape Charles, Hopedale, Nachvak, Fort Chimo. Common in White Mountains, above the tree line, in September. "An arctic, alpine, and subalpine species" (Sharp). Greenland, Siberia, Sweden, Finland, Lapland, Britain, Germany, France, northern Italy (Sharp).

65. *Agabus inscriptus* Crotch.

Described from Labrador. I have a few specimens from West St. Modest and Red Bay.

It is less common than *congener* with which it is united by Sharp. Crotch's *inscriptus* is a smaller form, less reticulate and more shining, more convex in form, and the color tends more to yellowish and red; while the *congener* form is darker, more opaque, and more depressed. *Inscriptus* is moderately common at Hermit Lake, Mt. Washington, N. H. (3,700 feet), but is seldom found above the tree line. *Inscriptus* Crotch is probably the beetle referred to as *discolor* Lec. by Packard in his list, from Indian Harbor.

66. *Agabus nigripalpis* Sahlb. (= *borealis* Sharp = *dissimilis* Sahlb.)

Stupart's Bay (R. Bell), several. This is the species listed by Packard as *Agabus longulus* Lec.? Regarded by Sharp as probably a variety of *congener* Payk. My single specimen, one of the Bell specimens presented to me by Mr. W. H. Harrington, is a narrow elongate beetle, with the sides very parallel, much smaller than any of my own Labrador allied specimens and quite different in appearance. This same form also taken at Cape Digges by Dr. Bell.

67. *Agabus infuscatus* Aubé.

Ungava Bay (Turner: Schwarz list). Very common West St. Modest, Hopedale. Either this species or *inscriptus* Crotch is undoubtedly the beetle from Caribou Island listed by Packard as *ambiguus* Lec. This Labrador species is the real *infuscatus* of Aubé, as I know from typical specimens received from René Oberthür.

Whether the beetle taken by Mr. Bowditch in Lakes of Clouds, Mt. Washington, N. H., in July, is the same as this Labrador species I do not know, but all the specimens of *infuscatus* Aubé I have ever seen are from Labrador.

68. *Agabus arcticus* Payk. (= *subfasciatus* Lec.)

Caribou Island (Packard). Very common West St. Modest, Red Bay, also Hopedale. In North America this very distinct species is confined to Labrador. Arctic Siberia, Sweden, Finland to 69° north, Scotland, Alsatia (Sharp).

69. *Agabus Erichsoni* G. & H. (= *nigroaeneus* Er. = *lutosus* Crotch.)

West St. Modest, Nachvak; rare. I have collected this species with Mr. Blanchard, at Tyngsboro, Massachusetts. It looks superficially very much like an *Ilybius*.

I also have specimens from Aweme, Manitoba (Criddle) and Chatham, Michigan. Sweden, Finland, France, Germany (Sharp).

70. *Agabus tristis* Aubé.

Nachvak, several: one from Cape Charles; all specimens were the black variety. Mr. Bowditch found the brown variety very common in the Lakes of Clouds, Mt. Washington, N. H., in July. I was much disappointed not to find it there in September.

Both forms occur in Alaska. Dr. Van Dyke sent me a liberal series from Dutch Harbor, Unalashka. Hamilton mentions its occurrence in America north of Arctic circle, also Lake Tahoe, California, New Mexico, and Arctic Siberia.

71. *Agabus fuscipennis* Payk.

About twenty specimens from West St. Modest. A very distinct species, not previously recorded from North America. Siberia, Sweden, Finland, North Germany (Sharp). An allied, apparently undescribed species, considerably larger, is found in Alberta.

72. *Agabus lævidorsus* Lec.

Caribou Island (Packard). This is evidently a manuscript name and I do not know what species is referred to.

73. *Agabus* sp.

An undetermined *Agabus* is mentioned in Fletcher's list of species from interior of Labrador.

74. *Rhantus bistriatus* Bergst.

Red Bay, one specimen. Mt. Washington, N. H., Lakes of Clouds (5,000 feet) Bowditch), and at Hermit Lake (3,700 feet) by myself. Antigonish, Nova Scotia; Tyngsboro, Mass. (Blanch-

ard); Wingdale, N. Y.; Golden, B. C., Waghorn, Alberta; Detroit, Mich. (Sherman collection). Lake Superior, Hudson Bay, central and northern Europe, east and west Siberia (Hamilton).

75. *Rhantus binotatus* Harris.

Labrador (probably). Packard list. Common in White Mountains, both below and above the tree line. Widely distributed in North America.

76. *Colymbetes sculptilis* Harris.

Caribou Island, Square Island, Hopedale (Packard). White Mountains, N. H., below and above the tree line. Lake Superior (LeConte); Long Island. The common species in eastern United States.

77. *Colymbetes rugipennis* Sharp.

Red Bay, common. Described from northern boundary of Nebraska. Mr. Roberts considers this to be a good species. It occurs also at Winnipeg.

78. *Colymbetes grœnlandicus* Aubé.

A lot from Nachvak. Ungava Bay (Turner: Schwarz list). Régimbart (Bulletin Entomological Society of France, Vol. XVII, 1889) regards *grœnlandicus* Aubé (Greenland, Iceland, Labrador), *Drewnski* Lec. (Greenland), *Thomsoni* Sharp (Lapland, Iceland) as varieties of *dolabratus* Payk., which Dr. Van Dyke took on the Alaskan islands.

79. *Dytiscus dauricus* Gebl.

West St. Modest, Red Bay. Interior of Labrador (Low: Fletcher list). I took this species at Hermit Lake, Mt. Washington, N. H. (3,700 feet). Maine to Alaska; Kamtschatka; Dauria (Hamilton).

80. *Dytiscus parvulus* Mannh.

One or two specimens from Nain and Hopedale Mr. Roberts refers to this species, which was described from Alaska.

81. *Gyrinus minutus* Fabr.

82. *Gyrinus affinis* Aubé. ?

These two species are listed by Packard from Square Island.

83. *Gyrinus picipes* Aubé.

Red Bay, West St. Modest, Cape Charles, Hopedale. Blanchard writes: "It seems as though your Labrador *Gyrinus* ought to be *picipes*, of which Le Conte remarked he had three from Labrador 'one of which does not seem to differ from Alaska types sent by Chaudoir.' Description of *opacus* Sahlb. however fits much better. Le Conte had Greenland examples of *opacus*."

Gyrinus picipes occurs from Alaska to Labrador.

84. *Helophorus lineatus* Say.**85. *Helophorus inquinatus* Mannh.**

Ungava Bay (Turner: Schwarz list). Mr. Schwarz states that these are not to be considered definite determinations, as the genus requires thorough investigation. Both of the above species are on the Bowditch list of Mt. Washington, N. H., species. *H. inquinatus* Mannh. is recorded from Alaska and Lake Superior.

86. *Philhydus bifidus* Lec.

Caribou Island (Packard); Lake Superior, New England States.

87. *Hydrobius fuscipes* Linn.

Ungava (Turner: Schwarz list); West St. Modest, not rare. Mt. Washington, N. H., summit (Bowditch). Hamilton says: "Very variable and widely distributed in temperate and boreal America; general in Europe; Kamtschatka, east and west Siberia, Turkestan."

88. *Silpha lapponica* Linn.

Caribou Island to Hopedale (Packard); Ungava Bay (Turner: Schwarz list); West St. Modest, Red Bay, Nachvak; interior of Labrador (Fletcher list). Schwarz says: "Occurs all over North America except in the southeast, being still common as far south as San Diego, Cal. In Europe it is strictly arctic and does not occur even in the alpine regions." Fall mentions its occurrence at Cape Blossom, Alaska, within the Arctic circle.

89. *Choleva luridipennis* Mannh.

West St. Modest, a few. Described from Alaska; occurs eastward to New England States.

90. *Agathidium obsoletum* Lec.

Square Island (Packard). No such name appears in Henshaw's

index of the Le Conte species; nor is it used in Horn's Revision of the Silphidæ.

91. *Homalota* sp.

92. *Homalota* sp.

93. *Placusa* sp.

These three are from Ungava Bay (Turner: Schwarz list). Mr. Schwarz writes: "The Aleocharinæ of this list are in an extremely poor state of preservation, and no attempt should be made to name them specifically."

94. *Quedius sublimbatus* Mäkl.

Blanc Sablon (R. Bell: Packard). Hamilton gives Alaska, Lake Superior, eastern Siberia, Behring Island.

95. *Quedius molochinus* Grav.

West St. Modest, a few. Mt. Washington, N. H., summit (Bowditch); Alaska, all North America to Mexico, Siberia, Mediterranean countries, all Europe (Hamilton); Newfoundland (Bolster).

96. *Quedius fulvicollis* Stephens. (= *hyperboreus* Er.)

West St. Modest, one; Mt. Washington, N. H., summit (Bowditch); Unalashka and eastward (Hamilton).

97. *Creophilus maxillosus* Linn. var. *villosus* Grav.

Caribou Island (Packard). Cosmopolitan. Greenland (Schiödte); Newfoundland (Bolster); Alaska (Hamilton).

98. *Tachyporus* sp.

Hopedale (Packard).

99. *Bryoporus rufescens* Lec.

Ungava (Turner: Schwarz list); Mt. Washington, N. H., summit (Bowditch).

100. *Bledius* sp.

Labrador (Packard).

101. *Acidota quadrata* Zett.

Ungava (Turner: Schwarz list); West St. Modest, one. Mt. Washington, N. H. (Bowditch); Alaska, Colorado, Lake Superior, Arctic Siberia, Lapland (Hamilton).

102. *Arpedium brachypterum* Grav.

Nain and Hopedale, three or four. Lake Superior, Europe. Two very similar species in White Mountains (Blanchard).

103. *Homalium lapponicum* Zett.

Ungava (Turner: Schwarz list). Alaska, Marquette, Mich., Massachusetts, central and northern Europe, western Siberia (Hamilton); Newfoundland (Bolster).

104. *Coccinella nivicola* Muls. (= *monticola* Muls. = *lacustris* Lec.)

Okkak (Packard). Mt. Washington, N. H. (Bowditch); Alaska, Oregon to Colorado and New Mexico, Kansas, Michigan, Lake Superior, Arctic Siberia (Hamilton).

105. *Coccinella transversoguttata* Fald.

Interior of Labrador (Low: Fletcher list). Greenland (Lundbeck); Mt. Washington, N. H., summit (Bowditch); Alaska, Hudson Bay, south to Michigan and Kansas, Rocky Mountains to Mexico, Japan, Dauria, Lapland (Hamilton).

106. *Pediacus fuscus* Grav.

Hopedale, one specimen. Ungava Bay (Turner: Schwarz list). Oxford House, Hudson Bay (R. Bell); Alaska, Lake Superior, New Mexico, Colorado, central and northern Europe (Hamilton).

107. *Henoticus serratus* Gyll.

West St. Modest, one specimen. Mt. Washington, N. H., summit (Bowditch); Alaska, southward to Virginia and southern California, Europe (Hamilton).

108. *Cryptophagus* sp.

West St. Modest, two.

109. *Cryptophagus* sp.

Ungava Bay (Turner: Schwarz list).

110. *Cœnoscelis* sp.

Ungava Bay (Turner: Schwarz list).

111. *Atomaria* sp.

Caribou Island (Packard).

112. *Dermestes lardarius* Linn.

West St. Modest. Mt. Washington, N. H. (Bowditch); Nelson

River House, Hudson Bay (R. Bell); Europe and America; Greenland (Lundbeck).

113. *Epuræa truncatella* Mannh.

Ungava Bay (Turner: Schwarz list); West St. Modest, one. Mt. Washington, N. H., summit (Bowditch); Alaska, British Columbia to Canada, Washington, California, Colorado, New Mexico (Hamilton).

114. *Ips sanguinolentus* Oliv.

Caribou Island (Packard); Mt. Washington, N. H., summit (Bowditch).

115. *Latridius minutus* Linn.

West St. Modest, one specimen. Alaska, North America, Europe, Asia; cosmopolitan (Hamilton).

116. *Corticaria ferruginea* Gyll. (= *deleta* Mannh.)

Ungava Bay (Turner: Schwarz list); West St. Modest, three. Mt. Washington, N. H. (Mrs. Slosson); Alaska, Hudson Bay to Florida; Siberia, Dauria, Europe (Hamilton).

117. *Corticaria dentigera* Lec.

Ungava Bay (Turner: Schwarz list).

118. *Simplocaria metallica* Sturm.

West St. Modest. Greenland (Schiödt, Lundbeck). Common on summit of Mt. Washington, N. H., September, 1906. Alaska, Lake Superior, northern and alpine Europe (Hamilton).

119. *Morychus*, new species.

Ungava Bay (Turner: Schwarz list).

120. *Byrrhus americanus* Lec.

Caribou Island (Packard); West St. Modest, common. Mt. Washington, N. H., summit (Bowditch); Lake Superior, northeastern U. S.

121. *Byrrhus Kirbyi* Lec. (= *picipes* Kirby.)

Caribou Island (Packard); Ungava Bay (Turner: Schwarz list); West St. Modest, two. Described from latitude 54° by Kirby; Mt. Washington, N. H., summit (Bowditch).

122. *Byrrhus geminatus* Lec.

Ungava Bay (Turner: Schwarz list); summit of Mt. Washington, N. H. (Bowditch).

123. *Byrrhus cyclophorus* Kirby.

West St. Modest, Hopedale, common. Mt. Washington, N. H., summit (Bowditch); Alaska, Hudson Bay, Lake Superior, Colorado (Hamilton).

124. *Hypnoidus sanborni* Horn.

Ungava Bay (Turner: Schwarz list); summit of Mt. Washington, N. H., subalpine (Bowditch).

125. *Hypnoidus nocturnus* Esch. var. *bicolor* Esch.

Belles Amours, Strawberry Harbor, Indian Harbor (Packard); West St. Modest, very common; Hopedale, two. Mt. Washington, N. H., subalpine (Bowditch); Alaska, eastern Siberia (Hamilton).

126. *Elater nigrinus* Payk.

West St. Modest, two or three. Nelson River House, Hudson Bay (R. Bell); Alaska, Lake Superior, Vermont, Europe, Siberia (Hamilton).

127. *Paranomus costalis* Payk. (= *Eanus vagus* Lec.)

Square Island (Packard); West St. Modest, a few. Mt. Washington, N. H. (Bowditch); Lake Superior, Europe, Sweden, Finland, Lapland (Hamilton).

128. *Paranomus estriatus* Lec.

West St. Modest, about two dozen; Red Bay, one. Mt. Washington, N. H. (Bowditch); Lake Superior.

129. *Paranomus pictus* Cand.

Caribou Island to Square Island (Packard); West St. Modest, a few; Mt. Washington, N. H. (Bowditch).

The genus *Paranomus* is represented in Alaska by the species *decoratus* Mannh.

130. *Sericosomus incongruus* Lec.

Square Island (Packard); one specimen West St. Modest. Mt. Washington, N. H. (Bowditch); Sitkha, Alaska (Harriman Expedition, Schwarz); Banff, Alberta; Tenino, Wash. (Schwarz).

131. *Corymbites spinosus* Lec.

West St. Modest, a few. Mt. Washington, N. H., summit, very common (Bowditch); Oxford House, Hudson Bay (R. Bell); Mt. Monadnock (Blanchard); Newfoundland; Little Codroy River tableland (700 feet) (Bolster).

132. *Melanophila appendiculata* Fabr. (= *acuminata* Fabr. = *longipes* Say.)

Ungava Bay (Turner: Schwarz list); West St. Modest, Nain. Summit of Mt. Washington, N. H. (Bowditch); Cape Nome, Alaska, within Arctic circle (Fall). Found throughout North America, also in Kantschatka, Siberia, China, Europe (Hamilton).

133. *Melanophila fulvoguttata* Harris.

Ungava Bay (Turner: Schwarz list); Mt. Washington, N. H., summit (Bowditch). Mr. Schwarz remarks: "I have never been able to distinguish certain forms from *M. drummondi*."

134. *Melanophila guttulata* Gebl. (= *drummondi* Kirby.)

Hopedale, one specimen. Mt. Washington, N. H., summit (Bowditch); Alaska, Rocky Mountains to New Mexico, Hudson Bay, all Siberia, Mongolia, and the Amur countries; exceedingly variable in every way (Hamilton).

135. *Eros aurora* Hbst.

Interior of Labrador (Fletcher list). Summit of Mt. Washington, N. H. (Bowditch); Wrangel, Oregon, Hudson Bay to Georgia, Europe, east and west Siberia (Hamilton).

136. *Podabrus piniphilus* Esch.

Interior of Labrador (Fletcher list); Hopedale. Mt. Washington, N. H., subalpine (Bowditch); Alaska, Oregon, Montana, Canada (Hamilton).

137. *Podabrus extremus* Lec.

West St. Modest, one specimen. Mt. Washington, N. H. (Mrs. Slosson). Described from Hudson Bay.

138. *Podabrus lævicollis* Kirby.

Hopedale (Packard). Mt. Washington, N. H., alpine and subalpine (Bowditch); Lake Superior, British Columbia, Newfoundland; edge of tableland Little Codroy River (700 feet or more) (Bolster).

139. *Telephorus fraxini* Say. (= *Podabrus mandibularis* Kirby.)

Caribou Island (Packard); West St. Modest; Ungava Bay (Turner: Schwarz list); Mt. Washington, N. H. (Bowditch); Alaska to New Mexico, westward to Hudson Bay and southward to Virginia (Hamilton).

140. *Telephorus nigrutilus* Lec.

West St. Modest, Nain. Mt. Washington, N. H. (Bowditch); Newfoundland: edge of tableland Little Codroy River (700 feet or more) (Bolster).

141. *Telephorus curtisii* Kirby.

West St. Modest, a few. Summit of Mt. Washington, N. H. (Bowditch).

142. *Sitodrepa panicea* Linn.

West St. Modest, one. Alaska; cosmopolitan.

143. *Aphodius guttatus* Esch.

West St. Modest, two or three; common in Unalashka (Hamilton).

144. *Criocephalus agrestis* Kirby.

Ungava Bay (Turner: Schwarz list): West St. Modest, Red Bay, Hopedale, Fort Chimo; Nelson River House, Hudson Bay (R. Bell), Lake Superior.

145. *Criocephalus obsoletus* Randall.

Okkak (Packard).

146. *Xylotrechus undulatus* Say.

Ungava Bay (Turner: Schwarz list); summit of Mt. Washington, N. H. (Bowditch).

147. *Pachyta liturata* Kirby. (= *Argaleus nitens* Lec.)

Near Cape Harrison (Packard); Ungava Bay (Turner: Schwarz list); Fort Chimo, Hopedale. Nelson River House, Hudson Bay (R. Bell). Hamilton gives Alaska, British Columbia to Canada and north to Hudson Bay, Michigan, Vermont, Idaho to New Mexico.

148. *Acmæops pratensis* Leach. (= *semimarginata* Randall, = *fulvipennis* Mannh.)

Hopedale, three. Summit of Mt. Washington, N. H. (Bowditch).

Newfoundland, common; coast plain and edge of tableland, Little Codroy River; Bay of Islands; Humber River (Bolster). Alaska, through the Rocky Mountains to New Mexico, Wyoming, Michigan, Maine; arctic and eastern Siberia, northern China, alpine and northern Europe (Hamilton).

149. *Acmæops proteus* Kirby.

Ungava Bay (Turner: Schwarz list); interior of Labrador (Fletcher list); Hopedale, one. Summit of Mt. Washington, N. H. (Bowditch); Cumberland House, Oxford House, Hudson Bay (R. Bell); Lake Superior.

150. *Leptura hirtella* Lec.

This is *Leptura* species from Caribou Island, mentioned by Packard (Blanchard in letter). Mt. Washington, N. H. (Bowditch). A specimen probably of this species taken by Bolster at Bay of Islands, Newfoundland. Species occurs also in British Columbia.

151. *Leptura tibialis* Lec.

West St. Modest, one; Mt. Washington, N. H. (Bowditch); Lake Superior.

152. *Pogonocherus penicellatus* Lec.

Interior of Labrador (Fletcher list); summit of Mt. Washington, N. H. (Bowditch); Maine to Colorado (Fall).

Pogonocherus fascicularis DeG. is on Lundbeck's Greenland list.

153. *Syneta ferruginea* Germ.

• Interior of Labrador (Fletcher list); Mt. Washington, N. H. (Bowditch). Newfoundland: coast plain, Little Codroy River (Bolster).

154. *Plagiodera armoraciæ* Linn.

Ungava Bay (Turner: Schwarz list).

155. *Gonioctena pallida* Linn.

Interior of Labrador (Fletcher list); summit of Mt. Washington, N. H. (Bowditch).

156. *Stenotrachelus arctatus* Say. (= *obscurus* Mannh.)

Ungava Bay (Turner: Schwarz list); West St. Modest, Hopedale. White Mountains, N. H.; "The Perch" on Mt. Jefferson,

swept from dying balsam trees (Leng); Oxford House, Hudson Bay (R. Bell). Hamilton mentions Alaska, Rocky Mountains to New Mexico, Dakota and Lake Superior region north to Hudson Bay, Allegheny Mountains in western Pennsylvania.

157. *Pytho niger* Kirby.

Ungava Bay (Turner: Schwarz list); Mt. Washington, N. H. (Bowditch).

158. *Salpingus alternatus* Lec. ?

Ungava Bay (Turner: Schwarz list). Mr. Schwarz writes: "Will remain doubtful until some one monographs our American species." *Salpingus virescens* Lec. is recorded from summit of Mt. Washington, N. H. (Bowditch). *Salpingus elongatus* Mannh. occurs in Alaska (Hamilton).

159. *Mordella borealis* Lec.

Nain, one specimen. "Just like the specimen in my collection fished out of Lake of the Clouds, Mt. Washington, N. H." (Blanchard); Newfoundland: Little Codroy River, coast plain (Bolster).

160. *Lepyrus palustris* Scopoli. (= *colon* Linn.)

Cape Chidley (R. Bell, Packard); Ungava Bay (Turner: Schwarz list). Summit of Mt. Washington, N. H., apline (Bowditch); Hudson Bay, New Mexico, northern Wisconsin, Europe, and western Siberia (Hamilton).

161. *Pachylobius picivorus* Germ.

Ungava Bay (Turner: Schwarz list); Mt. Washington, N. H. (Bowditch).

162. *Hypomolyx piceus* DeG. (= *pineti* Fabr.)

West St. Modest, two; Hopedale, one. Mt. Washington, N. H. (Bowditch); Lake Superior, Hudson Bay, central and northern Europe, Siberia (Hamilton); Newfoundland: coast plain, Little Codroy River (Bolster).

163. *Pissodes?* sp.?

Hopedale (Packard). Possibly the preceding species.

164. *Notaris (Erycus) æthiops* Fabr. (= *morio* Mannh.)

West St. Modest, half a dozen. White Mountains, N. H., Mag-

dalen Island (Blanchard); Newfoundland: coast plain of Little Codroy River (Bolster); Alaska, Vancouver, Manitoba, Great Slave Lake; northern Europe, Siberia, the Amur (Hamilton).

165. *Dendroctonus borealis* Hpk. (= *rufipennis* Mannh.)

Mr. Schwarz writes: "Your Labrador *Dendroctonus* has been determined by Dr. Hopkins as *borealis* Hpk., a species of great interest in regard to geographical distribution, since it was recorded previously only from the north Pacific coast." Alaska: Eagle, and Kenai.

166. *Dendroctonus terebrans* Oliv.

Ungava Bay (Turner: Schwarz list); "Determination after Hopkins's monograph" (Schwarz). New Hampshire to Georgia (Hopkins).

ADDENDA.

Two small lots of Labrador beetles received from Red Bay this summer contain examples of three species not mentioned in the foregoing list. The species are:

167. *Tachinus parallelus* Horn.

One specimen, male, "smaller than my females from Mt. Washington" (Blanchard). This species is on the Bowditch list of Mt. Washington species. Mr. Blanchard remarks that *Tachinus clongatus* Gyll., a European species, recorded from Alaska also, must be very near *parallelus* Horn.

168. *Neomysia subvittata* Muls.

Two specimens. "A new variety, which does not agree exactly with Mulsant's description, nor with either of the two forms described by Casey" (Leng).

169. *Hylobius confusus* Kirby.

One specimen, Red Bay. Mt. Washington, N. H. (Bowditch list), Alaska, Lake Superior, New York, Massachusetts (Hamilton).

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VOL. XVIII.

No. 4.

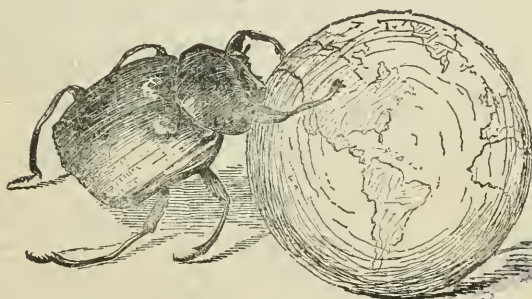
JOURNAL

OF THE

NEW YORK

Entomological Society.

Devoted to Entomology in General.



DECEMBER, 1910.

Edited by CHAS. SCHAEFFER.

Publication Committee.

CHARLES SCHAEFFER
F. E. LUTZ.

R. C. OSBURN.
W. M. WHEELER.

Published Quarterly by the Society.

LANCASTER, PA.

NEW YORK CITY.

1910.

[Entered April 21, 1904, at Lancaster, Pa., as second-class matter, under Act of Congress of July 16, 1894.]

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JOURNAL

OF THE

New York Entomological Society.

Published quarterly by the Society, at 41 North Queen St., Lancaster Pa., and New York City. All communications relating to the JOURNAL should be sent to the editor, W. M. Wheeler, Bussey Institution, Forest Hills, Boston, Mass. all subscriptions to the Treasurer, Wm. T. Davis, 46 Stuyvesant Place, New Brighton, Staten Is., New York, and all books and pamphlets to the Librarian, C. Schaeffer, Museum, Eastern Parkway, Brooklyn, N. Y. Terms for subscription, \$2.00 per year, strictly in advance. *Please make all checks, money-orders, or drafts payable to NEW YORK ENTOMOLOGICAL SOCIETY.*

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JOURNAL

OF THE

New York Entomological Society.

VOL. XVIII.

DECEMBER, 1910.

No. 4.

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NEW YORK CITY.

(With Plate VI.)

In the early part of the present year the writer was engaged in the rearrangement of Dr. Wm. Barnes' collection of North American Geometridæ which is stationed at his home in Decatur, Illinois. This collection is undoubtedly the largest of its kind in the United States, not excepting that in the National Museum, which, however, is richer in types. Among the material studied were many new species, a few of which are described in the present paper. The remainder of the material will be worked up as opportunity serves, though perhaps only in connection with the groups to which the species respectively belong.

1. *Mesoleuca interrupta*, new species.

Expanse, 20-21.5 mm. Palpi, head and thorax pale yellowish, the central portion of the front, vertex at base of antennæ and thorax at insertion of primaries dark brown. Antennæ beneath, brown or yellowish, above marked alternately with brown and white. Abdomen above, whitish, dusky on central segments, with brown central spots which tend to disintegrate laterally, last segment brown with central white stripe, anal brush yellowish; beneath, entirely yellowish. Primaries white, more or less profusely dusted over with dusky scales. Basal line about one-fifth out, white, rather narrow, sharply angulated on cubital and anal veins. Intradiscal line crosses less than one-half out, white, quite broad, somewhat irregular in its course but on the whole curved

outwardly. Costal region of the areas on either side of the basal line dark brown. Extradiscal line white, somewhat lost in the dusky scales just outward of this line, begins on costa one-third in from apex, curves inward to M_1 , then to Cu_2 is produced outwardly in two scallops and then runs irregularly inward to inner margin, sending a spur to the intradiscal line in the submedian space. The area between the intra- and extradiscal lines is filled in with light and dark brown, the darker color occupying the costal and inner marginal regions and a portion of the inner central space between M_1 and Cu_2 ; the lighter color occupying the remainder. Submarginal space with a costal blotch formed of the dusky scales, which latter also occasionally form one or two brokenly scalloped lines following in general the extradiscal line. A large subapical patch on outer margin sending two or three rounded teeth inwardly. Terminal line fine, incomplete, showing only on lower portion of wing where it is not absorbed by the apical patch. Fringes checkered. Secondaries rather uniformly pale smoky, with a faint reddish tinge. A moderate, dusky, discal spot. An indication of a median stripe on inner margin. Terminal line brown, sending small squarish spurs into the inner half of the fringe. Beneath, evenly smoky on primaries in central and inner areas, remainder yellow with brown strigations. The central fascia and subapical patch are reflected, but not strongly. Secondaries whitish-yellow, finely strigate with brown. A brown irregular cross-line best marked on costa extends two-thirds across the wing outward of the middle. Occasionally this reappears on the inner margin near the anal angle as a diffuse spot. A second, large conspicuous spot is on the center of the inner margin and tends rarely to unite with the discal spot.

Types.—Four males and three females, all in Dr. Barnes collection except two cotypes, which are with the author.

Habitat.—Redington and Santa Catalina Mts., Arizona. I have before me also several other poor specimens which have not been made cotypes.

The species is not a typical *Mesoleuca*, but is referred here in the absence of a more suitable genus. In structure it differs only in the long palpi, which are slender and project far beyond the head. In general appearances it differs considerably from the more typical members of the genus.

2. *Mesoleuca interrupta ochreatea*, new variety.

This form, which at first glance appears very closely to resemble the species to which I refer it as a variety, is seen on close observation to differ from it in many points, which however I am inclined to regard as only varietal. Aside from the bright yellow ground color of the primaries, which contrasts strongly with the pure white of typical *interrupta*, the median fascia is unbroken and less attenuated posteriorly; the basal and intradiscal lines are narrower and extend further out on the cubital vein making, in the case of

the latter, a deep indentation in the inner edge of the median fascia; and the subapical patch is larger and prolonged into the wing. All in all, there are so many points of difference toward which the eleven examples of typical *interrupta* do not tend that I think a varietal name is warranted.

Type.—One female in Dr. Barnes' collection.

Habitat.—Palmerlee, Cochise Co., Arizona.

3. *Hydriomena viridescens*, new species.

Expanse, 23–26 mm. Head pale bluish-green, palpi largely dark brown, antennæ whitish, fringed with brown. Thorax greenish, with four brown spots arranged in a square on the dorsum, and one at the inception of each fore wing. Abdomen gray with narrow white bands at the apex of the individual segments dorsally which extend anteriorly in the middle and divide into two parts a brown blotch which just precedes it. Primaries evenly pale bluish-green (which color becomes almost white or yellowish on exposure to light), crossed by ten or eleven denticulate or scalloped narrow black lines. The first, close to the base of the wing, is frequently a mere dot, or may be absent entirely. The second and fourth are curved outwardly and are usually well-defined, and between these runs the third which is diffuse, comparatively broad, and occasionally incomplete or absent. From the outer of this series of lines to the sixth the ground color is whiter. The sixth line is strongly marked, sharply denticulate and, as a whole, less curved outwardly than any of the others. Line five is narrower but in general the same. The seventh line, very narrow and only faintly denticulate, may run through the elliptical discal spot or directly outside it. Between lines eight and ten which are well scalloped the ground is whiter again and divided into two by a fine line (number nine). The eleventh line is rather broad, diffuse and frequently broken, especially in the central portion of the wing. A black blotch between veins R_5 and M_3 represents the remnant of the twelfth line. Terminal line indicated by a black spot on either side of each vein. Fringe checkered black and faintly pinkish, more or less markedly. Secondaries salmon colored, paler inwardly. Terminal line as in primaries but fainter and more diffuse. Beneath, primaries salmon colored outwardly, the markings of above feebly reflected, and sometimes with a large, diffuse subapical shade. Secondaries as above but with small, dark discal spot.

Types.—Five males and seven females in the collection of Dr. Barnes and the author.

Habitat.—Provo, Utah, August 4–14; Santa Catalina Mts., Sept., Huachuca Mts., Baboquivaria Mts., Pima Co., July 15–30 (Poling), and Redington, Arizona.

This neat little species, of which I have seen other specimens from the same general region, is most nearly related to "*Canocalpe*" *magnoliata* Gn. and differs principally in its smaller size, narrower

and more defined cross-lines and the salmon-colored hind wings. It soon loses the greater part of the delicate green tint of the fore wings when placed in the light or in a relaxing box for even a short time.

I place this species provisionally in *Hydriomena*, where so many odd species belonging to the *Cidaria* group are mingled. Its immediate ally, *magnoliata*, has recently been rejected from the genus *Canocalpe* by Pearsall (Can. Ent., XLI, 366) to which, with *aurata* and *oxygramma*, it was long known to be a dissonant associate; but he has not provided another genus for its reception.

4. *Stamnodes albiapicata*, new species.

Expanse, 26–28 mm. Head and palpi brown with some light colored scales intermixed; thorax brown; abdomen yellowish, first segment and part of the apical segments brownish. Wings above pale smoky, the costal area dark brown interrupted with four white patches; the first square, rather small, situated one-fifth out from base; the second over one-third out, similar in shape to the first but larger, and tending to widen posteriorly; the third rectangular and occupying the space from the center of the wing to a point almost two-thirds out on costa; the fourth narrow, beginning less than one-third in from the apex and extending obliquely inward to vein M_1 . Apex slightly paler than the rest of the wing and with a faint reddish tinge. Fringes white, marked with brown at ends of veins. Beneath, primaries as above but with the brown extending further in toward middle and somewhat broken up by whitish mottlings, more or less profuse. The white costal markings are obscured or entirely lost as a result of this mottling except the oblique line which stands out contrastingly. The apex to R_5 is white, more or less sprinkled over with brown scales. Secondaries mottled with light and dark brown over a whitish background, the dark brown interruptedly marking some of the veins and tending to form three large patches, one within the discal cell, one nearer the outer margin between M_1 and M_3 , and another on the inner margin near the anal angle. Just preceding these two latter spots are indications of a curved whitish cross line, best marked on the costa and inner margin. Apical area sometimes pure white. Discal spot elliptical, white, conspicuous.

Types.—Two males in Dr. Barnes' collection and in that of the author.

Habitat.—Redington, Arizona.

Allied to *Stamnodes gibbicostata* Walk., but smaller, more frail and narrower winged.

5. *Annemoria pectinaria*, new species.

Expanse, 26 mm. Palpi and front pink, vertex green; thorax green;

abdomen whitish-green, without markings. Primaries pea-green with numerous fine, whitish transverse mottlings, costa narrowly white on outer three-fourths, fringe edged with white. Two narrow, white lines cross the wings. The first beginning on the radial vein, inward of the middle, extends outwardly curved and slightly irregular to inner margin ending less than one-fourth out from the base of the wing. The second begins on the costa one-fifth in from the apex and extends slightly outwardly curved and with scarcely perceptible teeth on the veins in the lower part of the wing to a point just outward of the middle on the inner margin. Secondaries pale green becoming darker green toward inner margin. An outwardly curved white line on inner fourth. A denticulate white line midway between the first line and the outer margin. This line to Cu_2 runs much like the first but less strongly curved, then turns outward to inner margin. Both the lines are twice as broad as those on the primaries. Beneath, rather even pale green, darkest on costal and apical areas of primaries, the outer line of both wings reflected.

Type.—One female in Dr. Barnes' collection.

Habitat.—Redington, Arizona.

Allied to *Annemoria bistriaria* Pack., from which it differs by the much narrower lines on the primaries, the presence of an inner line on the secondaries and by the outer line on these latter wings being strongly denticulate.

The antennæ of the present species differ from those of the female of *bistriaria* in being shortly pectinated at the basal two-thirds instead of dentate.

6. *Synchlora lesteraria*, new species.

Expanse, 19–23 mm. Front green, vertex white; thorax green, whitish centrally and with a white collar; abdomen whitish with pale brown dorsal tufts on four or five of the anterior segments. Wings even pale apple-green. Primaries with an outwardly oblique broken white line crossing the wing about one-fourth out from base; this is vague or indicated by a spot near costa, but becomes broader and more continuous toward inner margin and tends to broaden still more at the anal vein. Inwardly of this line, below cubitus, is a small, irregular, cream colored patch with a few brown scales upon it, and below the anal vein is a much larger similar spot which fills the space from the line half way to the base of the wing. An outer white line on about outer fourth of wing shows as an outwardly curved, narrow crescent between M_1 and M_3 , followed by a rather large cream colored spot with brown scales, and from Cu_1 to inner margin as an inwardly curved line, somewhat toothed on the veins and in the interspaces. In the anal angle to this line is a large cream colored spot with scattered brown scales which collect, more densely near the outer edge of the patch, into a short zigzag line. Discal spot absent. Fringe white. Secondaries with basal portion of wing wholly white, the outer margin oblique and nearly continuous with inner line

of primaries. Outer line fine, sinuous, following in general the outer margin but extending well in toward the center of the costal and inner margins. There are spots outward to this line as on primaries and similarly disposed, except that the one in the anal angle is further removed along the inner margin. In addition there is also a diffuse white patch outward of the line on the costa. Beneath, both wings even pale green, all the markings of the upper side reflected in white.

Type.—Two males from Dr. Barnes.

Habitat.—South Arizona, May 1-15 and Santa Catalina Mts., Pinal Co., Arizona.

This species is in appearance much like *Racheospila niveociliaria* H. S. (= *saltusaria* Hulst).

7. *Aplodes splendidaria*, new species.

Expanse, 31 mm. Palpi and front pink, vertex white anteriorly, green posteriorly; thorax and abdomen green, the latter apparently without dorsal spots, though being partly discolored by grease this cannot be said with certainty. Primaries apple-green, costa rather broadly edged with deep flesh-color, outer edge deep red, narrowly interrupted at the veins with whitish, inner half of fringe white, outer half pink. Two rather broad and well defined white lines cross the wing. The first begins outward of the middle on vein M_1 and runs with an outward curve inwardly obliquely to inner margin, thence following the inner margin to base of wing. The second begins on R_5 between the origin of the first line and the apex of the wing and extends in an almost straight line to inner margin ending less than one-third in from the anal angle. No discal dot. Secondaries lighter green than primaries, the costal area and the veins whitish. Outer edge and fringe as in primaries. Two whitish lines cross the wing; the first on inner third outwardly angled in the cell and again between the cubital and anal veins; the second on outer third, strongly curved outwardly to below Cu_1 then bent inward to inner margin. Beneath smooth green, the inner area of primaries whitish, flesh-colored costa, red outer margins repeated, the cross lines also showing but more feebly.

Type.—One male in Dr. Barnes' collection.

Habitat.—Palmerlee, Arizona.

This species with its bright green color, contrasting white markings and dark red borders is the most beautiful of the genus. It is most nearly allied to *obliqua* Hulst, but the inner line is inwardly instead of outwardly oblique as in Hulst's species.

✓ 8. *Aplodes strigataria*, new species.

Expanse, ♂ 28 mm., ♀ 32-35 mm. Palpi white, upper surface with scattered red scales, terminal joint entirely red; front red; vertex white. Thorax and abdomen uniformly pale green, or, the latter with the segments edged

posteriorly with white. Wings pea-green, profusely strigated with irregular, transverse, whitish markings; costa of primaries narrowly edged with white; fringe whitish, occasionally with a narrow pink line at inner edge, and marked with pink at the ends of the veins. There are traces of an outwardly curved, white, inner line at inner third of both wings. A rather narrow outer line crossing both wings is more defined, yet sometimes lost in the transverse markings. On the primaries it is situated slightly inward of the outer third, runs parallel to the outer margin and is somewhat scalloped. On the secondaries it crosses outward of the middle, is decidedly scalloped and follows in general the course of the outer margin, being somewhat bent outward below the median vein. Discal dots vague but present on all wings. Beneath, uniformly green, paler than above, with faint reflections of the outer line of upper side. Fringe as above.

Types.—Two males and four females from Dr. Barnes (two of the cotypes in my own collection) and one female from Mr. Frank Haimbach and in his collection.

Habitat.—Huachuca Mts., Arizona, July; Redington, Arizona; South Arizona, July 15-30.

Distinguished from its congeners by its large size and profusely strigated wings. *Aplodes darwiniata* rivals it in size, but in this species the strigations are fine and exceedingly faint in comparison.

9. *Cymatophora trilinearia*, new species.

Expanse, 27-29 mm. Head whitish-gray, the front sometimes margined with yellow. Palpi and antennæ pale yellow. Thorax and abdomen whitish-gray, the former with a narrow yellow collar, the latter tinged with yellow which becomes more intense apically. Primaries whitish-gray, more or less scattered over with brown atoms; costa narrowly edged with yellow. Three usually well defined pale brown lines of moderate breadth cross the wings. Rarely these are represented by pale yellow spaces, or are somewhat obscured by the profusion of brown atoms. The first crossing slightly outward of the inner fourth extends outward from costa, turns downward within the cell and thence runs almost straight to inner margin, being slightly curved inwardly between the cubital and anal veins. The median line, sometimes reduced to a mere shade, originates in a yellow costal spot, is either straight or curved outwardly above Cu and inwardly curved below this vein, and precedes or passes through the small round or elongated discal spot when this is present. The outer line, also originating in a yellow costal spot, crosses the wing about one-third in from the outer margin, extends outward from costa to M_1 , then inward to inner margin curving evenly outward before reaching that edge. One-sixth in from the apex, on the costa, is a triangular yellow spot edged with brown, and occasionally a second yellow patch is present in the outer area between M_3 and Cu_2 . A black terminal line showing between the veins, more particularly in the central portion. Fringe gray or brownish-gray,

divided by a fine white line which runs through the center. Secondaries pale yellow, more or less irrorate with brown atoms, especially toward inner margin. A single rather broad, diffuse line (sometimes absent) passes through the center of the wing approximately parallel to the outer margin. Terminal line brown, narrow. Discal spot absent. Fringe light gray or brownish. Beneath, both wings pale yellow, the primaries somewhat grayish on inner and basal areas. Brown irrorations are present over the secondaries and over yellow portion of primaries.

Types.—Six males and three females in Dr. Barnes' collection and in that of the author.

Habitat.—South Arizona, July 15–30, Aug. 1–15, and Gila Co., Arizona, June (Poling); Redington, Palmerlee and Huachuca Mountains (Barnes).

This is the species referred to by me in the Proceedings of the Entomological Society of Washington, Vol. X, p. 87, as *Cymatophora tenebrosata* Hulst.*

The specimens before me do not run so variable as those in the National Museum but have tendencies in similar directions.

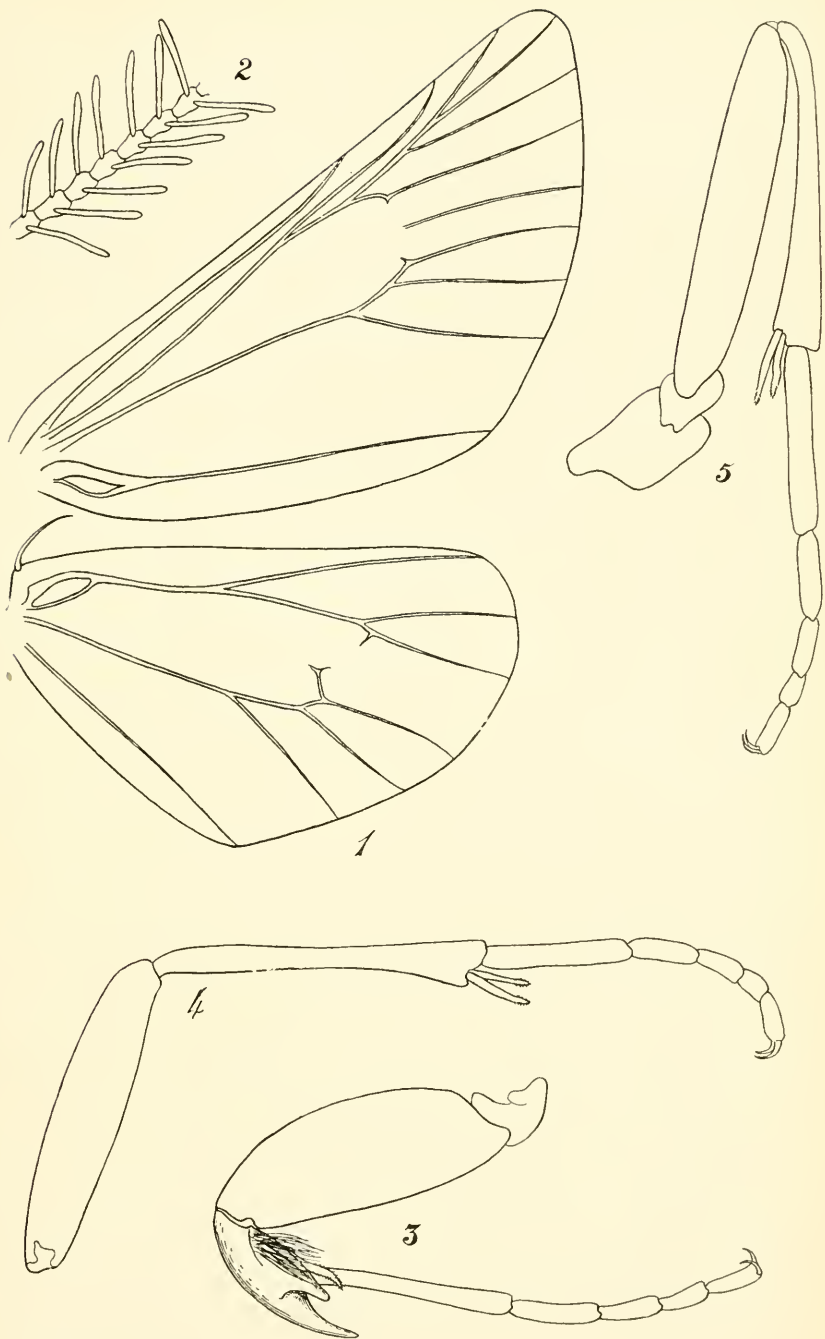
The species is allied to *Cymatophora inquinaria* Hulst, but compared with examples of that species at hand in smaller, whiter, far less strigate on the primaries (which in the present species is scarcely strigate when the atoms are profuse), and with comparatively minute discal spot when this is present at all.

Barnesia, new genus.

Front slightly longer than broad, smooth; palpi short, not extending beyond the front; antennæ bipectinate to tip in both sexes, the pectinations of the male long and somewhat clavate apically, those of the female short; tongue absent. Thorax and abdomen robust, the former tufted posteriorly, the latter smooth. Tibia of anterior legs short, swollen, with two large, apical corneous processes of unequal length which take the form of spurs; epiphysis originating near base of joint and extending beyond the shorter of the apical processes. Middle and posterior tibiæ with a single pair of spurs, the posterior tibia without a hair pencil. Fore wings moderately broad, costal margin very slightly concave, outer margin evenly rounded or with a trace of an angle at the center, veins R_2 , R_{3+4} and R_5 on one stalk, no accessory cell; hind wing with outer margin evenly rounded or faintly angled at center, and angle slightly pronounced, vein Sc anastomosing with R for half the length of discal cell, M_2 absent.

Type.—*Barnesia ritaria* Gross.

* See Ent. News, Vol. XX, p. 353.



Structural characters of the genus *Barnesia* Grossb.

This genus of the Ennominae (*Geometrina* Prout, *Scridoscmida* Méyrick) is a very singular one combining characters of *Glaucina* and *Hulstina*.

10. *Cedaria ritaria*, new species.

Expanse, 20–25 mm. Head, palpi, thorax and abdomen with mixed brown and white scales, sometimes one sometimes the other color predominating. The brown scales of the abdomen occasionally collect into patches which are arranged at the base of the segments. Primaries cinereous, more or less overlaid with brown. Five brown lines somewhat diffuse and of moderate breadth cross the wing obliquely. The first, sometimes obsolete, crosses at inner fifth, is roundly bent outward below costa and thence extends slightly curved to base of inner margin. The second line crosses at inner fourth and is nearly parallel to the first, but is slightly toothed outwardly on the anal vein. The following two lines, crossing almost through the center, begin widely apart on the costa, curve outwardly one-third across the wing, meanwhile converging, and then extend obliquely inward to center of inner margin, curving outward again, however, before reaching that point. Immediately following the outer of these two lines is a fifth line, usually more diffuse than the others, and often broken in its course. The space between this and the preceding line is filled in with ochreous, though at the costal area this tint is occasionally lost. Sometimes the line bordering this shade externally is lost. A diffuse terminal shade is present running through the outer space. Terminal line narrow, dark brown. Fringes checkered. Discal spot absent. Secondaries almost wholly covered over with dark brown, the cinereous ground showing as two or three obscure bands crossing the outer half of the wing, most perceptible on the inner margin. Beneath, wholly cinereous or with primaries smoky. A broad, brown band sometimes crosses the secondaries on inner third in a straight line; rarely this is continued very faintly across the primaries.

Types.—Two males and three females from Dr. Barnes.

Habitat.—So. Arizona, April 1–15; Santa Catalina Mts., Pinal Co., Aug. 1–7; Santa Rita Mts., Pima Co.; Baboquivaria Mts., Pima Co., July 15–30—all Arizona.

A characteristic species which in a very general way may be likened to a small *Hulstina formosata* Hulst.

EXPLANATION OF PLATE VI.

- FIG. 1. Venation of *Barnesia ritaria*.
- FIG. 2. Section of antenna of male *Barnesia ritaria*.
- FIG. 3. Fore leg of *Barnesia ritaria*.
- FIG. 4. Mid leg of *Barnesia ritaria*.
- FIG. 5. Hind leg of *Barnesia ritaria*.

TWO NEW NOMADIDÆ (HYMENOPTERA) FROM
SOUTH AMERICA.

By C. SCHROTTKY.

PUERTO BERTONI, PARAGUAY.

1. *Epeolus osiriformis*, new species.

Black; clypeus, base of antennæ, tegulæ, legs and scutellum reddish. White tomentum on face, pleuræ, middle segment, legs and also in the thoracic sutures; two longitudinal lines of white tomentum on the mesonotum, transverse lines, more or less interrupted in the middle, on the apical margins of abdominal segments 1-4 (♀) or 1-6 (♂), lateral patches on 2-5 (♀) and another transverse line at the base of first segment (♀♂). Wings hyaline with the outer margin broadly fuscous.

Female.—Head nearly as broad as thorax; face densely clothed with white tomentum; vertex nude, strongly punctured, its posterior margin emarginate and clothed with white pile; the outer orbits throughout with fine downy yellowish-white pubescence. Mandibles red with black tips. Labrum nude, dusky, finely but closely punctured, with a depression in the middle, clothed with short downy pubescence. Clypeus red, twice as broad as long, its anterior margin straight. Eyes converging towards base. Posterior ocelli less distant from each other than from the eyes, but more than from posterior margin of vertex. Antennæ with the scape red, minutely punctured; the pedicel extremely short; the first joint of the flagellum almost half the length of the second which is longer than any of the succeeding joints.

Thorax stout, cuboid, although the dorso-ventral axis seems to be the longest. Pronotum reddish, extremely short, lower than the mesonotum. Mesonotum anteriorly broader than long, closely punctured, surrounded by a depressed line which is clothed with whitish pubescence, except on the anterior margin, rounded towards the pronotum and with red anterior lateral angles. Mesopleuræ strongly convex, forming an obtuse edge anteriorly. Calli red and covered with white tomentum. Scutellum nude, rather closely punctured and strongly bituberculate, the depression between the tubercles black, the posterior margin strongly overlapping the metanotum, with a line of white tomentum; at each side a punctured red spine. Metanotum reddish with two minute tubercles and clothed with whitish tomentum. Middle segment with its basal area nude, divided by a longitudinal rim, punctured only at the sides; the rest strongly punctured and clothed with white tomentum.

Abdomen longer than head + thorax, more than twice as long as mesonotum, with a very short, downy, velvety black tomentum and the above described white markings. The second segment the broadest; the pygidial plate dark rufous, broader than long, coarsely punctured with elongate rugose punc-

tures and clothed with stiff fuscous bristles; the hypopygium seems to be a trifle longer. Venter dark brown with a very thin and short white tomentum.

Wings. See above: the veins very dark brown, almost black; nerv. rec. 1 just in the middle of second cubital cell, nerv. rec. 2 a trifle behind middle of third cub. c.; second cub. c. very narrow above.

Legs ferruginous, only the claws and the spurs of second and third pair blackish. Spur of middle tibiæ microscopically pectinate; pulvilli at least half the length of claws.

Long. tot. 10-11 mm., lat. abd. 3.3 mm.

Male.—Exactly like the female, only the scutellum is not so strongly bituberculate, the depression between the tubercles is not black and the abdomen is very elongate, affecting the shape of *Osiris*; it is at least three times longer than the mesonotum and more than twice as long as broad. The pygidial plate is longer than broad, rounded at apex and with sharp lateral edges.

Long. tot. 11 mm.; lat. abd. 2.9 mm.

Paraguay, Puerto Bertoni, April 22, 1909, on flowers of *Vernonia* sp. (Compositæ).

In Dr. Friese' tables of the Argentine species (Flora og Fauna, Silkeborg, 1908) this species runs to *nobilis* (♀) or (*unifasciatus* =) *variolosus* Holmlg. (♂); it is however quite distinct from either.

2. *Cyphomelissa garleppi*, new species.

Black, entirely covered with bluish green pubescence, longest on the mesopleuræ (there with a blue tinge), legs and abdomen. Wings almost hyaline with darker exterior margin and with a strong metallic blue tinge all over.

Female.—Head much narrower than thorax. Eyes reaching base of mandibles, not converging below. Mandibles rather densely covered with elongate punctures, except the blunt tips. Labrum distinctly punctured. On the rest of the head or body no sculpture can be seen on account of the extremely dense pubescence. Clypeus with its anterior margin very faintly emarginate. Antennæ with a stout scape, bluish green by pubescence; the rest black and nude; the pedicel very short, its length scarcely one-fourth of the first joint of the flagellum, this a little longer than any of the succeeding joints. Posterior ocelli much nearer to each other than to the eyes or margin of the vertex.

Thorax stout with long bluish green hair. Tegulæ naked, minutely punctured.

Abdomen much longer than head + thorax, covered with shorter glittering green pubescence and longer blue hairs; the pygidial plate partly hidden under the pubescence, the visible part opaque, its apex rounded. Venter not quite as densely pubescent as dorsal surface.

Wings. Median cell much shorter than submedian; second cubital cell the largest, rhomboidal, with nerv. rec. 1 interstitial with second transverse cubital vein; third cubital cell triangular, its outer margin strongly curved.

Legs. Covered with greenish pubescence and longer blue hairs. Claws dark brown, deeply bifid. Pulvilli very small. Calcar of middle tibiæ scarcely to be called "bifid"; long and thin, the anterior side minutely serrate and it terminates with some small teeth, the hinder one being transformed into a stout, strongly curved spine.

Long. tot. 16 mm., lat. abd. 5.5 mm.

Peru, Apurimac (Otto Garlepp *l.c.*).

Under *Cyphomelissa* (Rev. Mus. Paulista, 1902, Vol. V, p. 493, and Plate XIV, fig. 5, *a-d*) I include those species described as *Melissa* which have a more or less bumble-bee-like shape and the third cubital cell petiolate, triangular or nearly triangular. The following species belong here:

1. *C. diabolica* (Friese) = *C. pernigra* Schrottky, the type of the genus. Wholly black with a broad excavated middle spur. Brazil, S. Paulo and Espirito Santo.

2. *C. superba* (Dcke.); thorax and base of abdomen with yellow pubescence; middle spur deeply bifid. Lower Amazons.

3. *C. viridis* (Friese); bluish green with small white lateral patches on abdomen, third cubital cell petiolate; middle spur thin, terminating in one long and one very short straight spine. Brazil, S. Paulo.

4. *C. jenseni* (Friese); blue, the male with white pubescence on head and anterior part of thorax; third cubital cell not completely triangular although much narrowed above; middle spur almost as in *garleppi*, but a little broader. Argentina, Mendoza, Tucuman.

5. *C. garleppi* n. sp. Described above. Peru.

NEW CLAVICORN COLEOPTERA.

BY CHARLES SCHAEFFER.

BROOKLYN, N. Y.

Family EROTYLIDÆ.

1. *Hapalips texanus*, new species.

Elongate, testaceous, shining, pubescence of upper surface rather short and not dense. Head narrower than the prothorax, obliquely impressed on each side at middle; moderately coarsely punctate, punctures well separated at middle but more crowded at sides. Antennæ reaching to the base of elytra; first joint stout, second joint narrower than the first but wider than the third, the latter twice as long as the fourth, fourth to eighth beadlike and gradually but feebly increasing in width, joints nine to eleven abruptly longer. Prothorax scarcely wider than long; sides straight to a little below the apical

angles where they are slightly arcuate, near the basal angles sinuate; apical angles feebly rounded, basal angles acute, rectangular; apical margin straight, basal margin arcuate at middle; surface rather coarsely punctate and on each side at middle near base shortly impressed. Elytra as wide as the prothorax at base; sides feebly arcuately narrowing to apex; apices rounded; surface punctate-striate; intervals visibly punctate, the punctures slightly smaller than those of the striae. Surface below shining and feebly pubescent, punctuation of abdomen coarse and rather dense at sides, finer and more sparsely placed at middle. Abdominal lines feebly carinate and rather short. Length 4 mm.

Brownsville, Texas (Point Isabel, August 5).

There is also a specimen before me, collected by the late Ottamar Dietz in Brownsville, which is slightly larger, the thorax has at middle of apical margin, a carina-like elevation and the apical margin is not straight but oblique from the angles to the middle. The disk is rather flat and the sides are more suddenly deflexed than in the above described species, which causes this point to appear obtusely carinate. The prosternum differs also in being transversely deeply impressed and the front tibiae are more dilated at apex with the inner margin arcuate. I take this specimen to be the male of the species described above, as Reitter described similar modification of the thorax of the male of his *H. mexicanus*; the male of *H. grouvellei*, Gorh., has no elevated carina at the middle of the anterior margin, but has this margin projecting hood-like over the base of the head.

Of the described Mexican species *H. parallelus*, Gorh. seems to be very near *H. texanus*, but in the latter the punctures of the elytral intervals are very distinctly visible, which in *parallelus* are said to be so fine as not to be easily seen. The figure of the female of *H. grouvellei* Gorh. from St. Vincent, Grenada, closely resembles the above described *texanus*, but that species has the elytral intervals not punctate and the male has the thorax differently formed.

Seventeen or eighteen species of this aberrant genus are known which look more like Cryptophagids than Languriids. The genus was first placed with the *Rhizophagina*, transferred later to the *Cryptophagida*, but on account of the tarsal structure placed by Grouvelle and Gorham with the *Languriina*.

Family MYCETOPHAGIDÆ.

2. *Mycetophagus arizonicus*, new species.

Oval, piceous, each elytron maculate with about ten yellow spots of which one is below the humerus, one below scutellum, three in a transverse row

about middle, three below these in an arcuate row and a transverse spot of irregular outline near apex. Head coarsely punctate. Antennæ rufo-testaceous, last three joints piceous and wider than the preceding joints. Prothorax about twice as wide as long; base wider than apex; sides feebly arcuate and not serrate; hind angles feebly rounded; basal impressions deep, circular; surface coarsely and densely punctate. Elytra oval; surface confusedly punctate; striae feebly punctate and scarcely visible. Body beneath and legs rufo-testaceous, coarsely punctate; prosternum at middle less closely punctate and more shining. Length 4 mm.

Huachuca Mts., Arizona.

As usual the maculation is variable and one or more spots may be absent, even in the same specimen one side of the elytra may have one or two spots less than the other. The elytral striae are more faintly punctate than in *californicus* Horn and in some specimens scarcely traceable. It differs from that species, besides the elytral maculation, in having a more densely and coarsely punctate prothorax and three-jointed antennal club. In *confusus* Horn, which I do not know, the elytra are said to be also very feebly striate, but the antennal club is four-jointed and the elytra maculate as in *flexuosus* Say.

3. *Litargus grandis*, new species.

Elongate oval, rather depressed; color piceous, legs pale; three undulate transverse rows of pale spots on elytra yellowish, which are situated near base, at basal third and slightly below middle and also some more indistinct spots on prothorax. Head moderately coarsely and densely punctate; antennæ elongate with a narrow, loose, three-jointed club. Prothorax rather more than twice as wide as long; sides arcuately narrowing to apex; basal angles feebly rounded; basal impressions distinct, linear, surface moderately coarsely, not densely punctate; pubescence black or piceous and yellow, the latter color condensed into more or less distinct small spots. Elytra elongate oval; sides feebly narrowing to apex; apex broadly rounded; surface confusedly punctate and moderately densely pubescent, pubescence piceous and yellow, the latter forming more or less distinct transverse rows of small spots. Underside ferruginous, moderately densely punctate. The anterior tarsi of the male are slightly dilated and three-jointed, in the female more slender and four-jointed. Length 4.5 mm.

Huachuca Mts., Arizona.

The yellow spots on the prothorax are not as distinct as those on the elytra, which latter, however, may also be almost absent as in one of the specimens before me. The large size, depressed form, the elytra without series of semi-erect hairs and the rather elongate

last three antennal joints, which are not as closely placed together as in our other species, separates this species from all the known North as well as Central American species. Judging from the description the Mexican *Cataplius irregularis* Sharp seems to resemble the above described insect but the form of prosternum and tibial spurs which are the same as in our species of *Litargus* separate the two.

Family MONOTOMIDÆ.

4. *Hesperobænus alternatus*, new species.

Color brown or piceous; antennæ, elytra and legs rufo-testaceous. Head alutaceous, coarsely and somewhat densely punctate, sparsely clothed with dirty gray hairs. Prothorax longer than wide; sides crenulate and feebly arcuate; base slightly narrower than apex; apical angles rounded not prominent; surface dull and coarsely punctate, punctures well separated on the disk but more dense at sides and absent in a longitudinal, narrow, median space. Elytra feebly depressed; sides slightly arcuate; surface striate; striæ with moderately coarse punctures; third and fifth intervals with a row of punctures from base to almost middle, the punctures are of equal size to those of the striæ. Body beneath coarsely but not densely punctured. Length 3 mm.

Huachuca Mts., Arizona.

This species resembles very much in form *H. abbreviatus* Mots., but differs in having the anterior angles not prominent, the elytral striæ much more coarsely punctate and the third and fifth elytral intervals punctate. It seems to be very near the Mexican *H. subtestaceus* Reit., and it is possible that this may prove to be the same.

Family CUCUJIDÆ.

5. *Læmophlæus impressifrons*, new species.

Pale-castaneous, elytra blackish with a somewhat oblique, pale spot, very slightly behind middle, upper surface sparsely pubescent. Head subtriangular; eyes prominent, in advance of the apical margin of prothorax; labrum and epistoma feebly emarginate; surface sparsely and finely punctate, longitudinally rather deeply impressed, epistomal suture indistinct; antennæ reaching slightly below middle of elytra, third joint slightly longer than second, fourth to eighth short, but feebly increasing in width, ninth to eleventh suddenly larger, forming a distinct club. Prothorax as wide as the head, very feebly narrowing to base; sides nearly straight; apical angles subacute; basal angles acute; sides near basal angles feebly reflexed; surface moderately densely punctate; lateral grooves distinct. Scutellum triangular. Elytra slightly wider than the thorax at base; sides feebly arcuate; apices arcuate-truncate; disc tristriate; intervals finely, confusedly, but not densely punctate; lateral carina obsolete. Underside except head, finely and sparsely punctate. Length, 2.75 mm.

Arizona.

The single specimen described is narrower than the females of *biguttatus* and *fasciatus*, has a different form of prothorax, the front of head broadly depressed at middle and the pale spot on each elytron is slightly postmedian.

6. *Læmophlæus flavosignatus*, new species.

Slightly depressed, black, shining, underside, legs and antennæ piceous; elytra with a yellow, irregularly rounded spot at middle. Head subtriangular; eyes moderate, not touching the apical margin of thorax; epistoma truncate, separated from the front by a deeply impressed and feebly arcuate line; labrum truncate in front; surface moderately coarsely, but not densely punctate, except at middle, where a narrow, longitudinal space is free from punctures; antennæ short, third joint longer than second; fourth to tenth subequal; eleventh, as usual, slightly more elongate. Prothorax as wide as the head; sides moderately arcuate in front, narrower behind and feebly undulate before the hind angles; the latter acute and slightly in advance of the basal margin; surface moderately coarsely but not densely punctate, lateral striæ distinct but not very deeply impressed. Scutellum triangular; sparsely punctate. Elytra slightly wider than the prothorax in its widest part; sides feebly arcuate; apices conjointly, broadly rounded; surface with sutural and two discal striæ on each side; intervals irregularly biserially punctate; lateral carina rather strong. Abdomen sparsely punctate. Length, 2.75 mm.

Arizona.

Differs from our similarly marked North American species by the truncate labrum and epistoma slightly more convex, the more graceful form and the last three joints of antennæ not enlarged in the single specimen, which I take to be a female. The pale spot on each elytron is situated at middle and not before or behind middle as in our other species.

7. *Læmophlæus macrocephalus*, new species.

Form depressed, elongate, shining, surface glabrous, color reddish testaceous, elytra paler. Head large, sparsely and rather finely punctate; epistoma broadly emarginate, epistomal suture deeply impressed; labrum truncate; eyes moderately prominent, situated at middle between the antennal insertion and the apex of thorax; antennæ long, reaching nearly to the apex of elytra, joints elongated, third slightly longer than second, sixth to tenth nearly equal in size but slightly longer and feebly wider than the two preceding joints. Prothorax quadrate, as wide at apex as the head; sides obliquely narrowing to the basal angles; the latter acute; surface finely and rather sparsely punctate; lateral stria distinct. Scutellum triangular, smooth. Elytra slightly wider than the thorax at base; humeri rounded; sides feebly arcuate; apices broadly

rounded; striæ feebly impressed and scarcely punctate; intervals extremely finely punctate; underside smooth, scarcely punctate. Length, 2 mm.

Huachuca Mts., Arizona.

The specimen described is a male and differs from those in our fauna, having the third joint of antennæ shorter than the second, the labrum entire and the form depressed, by the large head, the thorax narrower towards base and the size of the antennal joints. It resembles somewhat the figure of *L. cephalicus** from which, however, it differs in having different antennal joints, position of the eyes and apparently more elongate form. The figure of *L. lucanoiæ* Smith,† resembles the above described insect still more closely, but besides different color of head and prothorax, that species has a shorter prothorax, with the sides slightly sinuate behind, which are in *macrocephalus* almost straight from about apical fourth to the basal angles.

8. *Læmophlæus dimidiatus*, new species.

Form convex, color reddish testaceous, legs and base of elytra slightly paler; apical half of elytra, and abdomen piceous or fuscous, outer joints of antennæ fuscous. Head rather coarsely punctate, punctures well separated; finely, longitudinally impressed at middle; eyes moderately prominent; epistoma trisinate, epistomal suture deeply impressed; labrum broadly arcuate at apex; antennæ scarcely reaching the apex of elytra in the male, shorter in the female, third joint longer than second, joints three to eleven equal and elongate in the male, last three joints in the female slightly longer and wider than the preceding joints. Prothorax at apex as wide as the head across the eyes; sides arcuately narrowing to base, basal angles rectangular, acute; disk rather coarsely but not densely punctate; lateral stria well impressed. Scutellum transverse, scarcely punctured. Elytra wider than the prothorax at base; sides feebly arcuate; apices rounded; disk with seven, somewhat coarsely punctate striæ, intervals with a single row of punctures; sutural intervals rather confusedly punctate; alternate intervals wider than the others. Underside rather coarsely punctate; abdomen more finely and sparsely punctate. Length, 2.75 mm.

Huachuca Mts., Arizona.

This species is best placed near *L. adustus* Lec., from which it differs in being more elongate, sides of prothorax less arcuate and slightly narrower, more elongate antennal joints and disk of elytra with more striæ.

The series which I have taken at the above-mentioned locality

* Trans. Am. Ent. Soc., Vol. XI, pl. 7, fig. 2.

† Ann. Soc. Ent. Fr., 6th ser., Vol. I, pl. 4, fig. 7.

shows very little variation in color. The apical half of elytra is always darker than the basal half, in some specimens, however, the dark color becomes gradually paler towards apex. While in some specimens all the striæ are equally and distinctly impressed and geminate, in others the alternate striæ are more faint than the rest and the intervals are nearly equal. These latter must resemble the Central American *striatus* and *insolitus* which were described each from a single specimen.

g. *Læmophlæus denticornis* Casey, Trans. Am. Ent. Soc., Vol. XI, p. 94.

I am unable to find any difference between a specimen of this species from Texas in my collection and the description and figure of the Central American *L. addendus* Sharp.*

THE NORTH AMERICAN FORMS OF CAMPONOTUS FALLAX NYLANDER.†

BY WILLIAM MORTON WHEELER.

BOSTON, MASS.

Among the ants common to Eurasia and North America, *Campotonotus fallax* Nyl. is as noteworthy for its ability to form local races and varieties as it is for the monotony of its habits. Unlike the much larger *C. herculeanus* L., which exhibits a similar though less pronounced variability, it shows little or no tendency to invade alpine or boreal regions, but seems to have a decided preference for the warmer or subtropical portions of the north temperate zone. In the Old World it is not uncommon in Japan, northern India, central and southern Europe; in America it occurs throughout the United States, but is most abundant on the Gulf coast. I have seen no specimens from the colder portions of British America or from higher elevations in the Rocky Mountains.

For many years *C. fallax* has been passing in the literature as *C. marginatus* Latreille, but Emery has recently shown that the species should bear the name originally given by Nylander to speci-

* Biol. Cent. Am. Col., Vol. II, pt. 1, p. 529, pl. XVI, fig. 24.

† Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 31.

mens taken at Montpellier, in southern France, whereas the true *marginatus* of Latreille is a variety of *athiope* Fabr. and belongs to the group of *maculatus* Fabr. The typical *fallax* has since been repeatedly described from France, Austria, Germany, Switzerland, southern Russia and various localities along the Mediterranean littoral. No less than six different forms of the species have been recorded from Asia. Three of these (var. *quadrinotatus* Forel, subsp. *vitiosus* F. Smith and subsp. *brunni* Forel) occur in Japan, a variety *himalayanus* Forel is recorded from an altitude of 2,160 m. in the Himalayas, another, *lamecrei* Emery, from Tashkent, in Turkestan, and an undescribed variety is mentioned by Ern. André as occurring in the Amur region of Siberia. A small form, var. *ruzskeyi*, closely resembling the North American var. *minutus*, has been described by Emery from Sarepta, in southern Russia, Ruzsky has described a var. *kamensis* from eastern Russia and a var. *hyalini-pennis* Costa is known to occur in Sardinia. Although attention was called to the great variability of the species in North America by Forel as early as 1879 and by Mayr in 1886, Emery was the first to attempt a revision of our forms. In 1893 he enumerated and described two subspecies and six varieties from the United States. Among the many American specimens of *C. fallax* which have been accumulating in my collection during the past decade, I have been able to recognize all but two of these forms and have also found four others which are described below.

The following is a description of the typical European *fallax*:

Worker major.—Length 7-9 mm.

Head nearly as broad as long, subrectangular, a little broader behind than in front, with broadly and feebly excised posterior margin, convex dorsal and concave gular surface. Mandibles convex, 4-5-toothed. Clypeus with lateral borders slightly diverging anteriorly, somewhat convex but scarcely carinate in the middle; anterior border distinctly notched in the middle, slightly produced on each side as a blunt point. There is a deep dimple in the head near the middle of each lateral clypeal border. Frontal carinae lyrate; frontal area and groove distinct. Eyes rather large, flattened. Antennal scapes slender at the base, gradually enlarged distally, reaching a little beyond the posterior corners of the head. Thorax narrower than the head, broader in front, laterally compressed behind, in profile evenly arched above; epinotum rounded above, declivity concave below. Petiole nearly as broad as the posterior end of the epinotum, but not as high, its anterior surface convex, its posterior surface flat, margin sharp and, seen from behind, rounded and entire or very faintly

sinuate in the middle above. Gaster elongate elliptical. Legs rather long, with stout femora.

Surface shining, finely and densely shagreened, more coarsely on the head and most superficially on the gaster, so that the head, especially in front, is subopaque. In addition to this sculpture the upper surface of the head is covered with small foveolæ, or coarse punctures, which are most abundant on the cheeks. Mandibles densely striatopunctate. Upper surface of pronotum and mesonotum covered with small, indistinct punctures.

Hairs and pubescence pale, very sparse, the former long and erect, the latter visible only on the cheeks, mandibles, antennæ and gaster. Legs, except for a few hairs at the tips of the femora, naked.

Head, thorax and gaster black or piceous; mandibles, antennæ, borders of the thoracic sclerites and sometimes the whole thorax darker or paler chestnut brown. Legs brown or yellowish, sometimes variegated with fuscous. Thin posterior borders of gastric segments yellow.

Worker minor.—Length 4–6 mm.

Differing from the worker major in the smaller head, relatively longer antennæ and blunter petiolar border. The head is more shining and the foveolæ on the cheeks are indistinct. The clypeus is more convex and carinate or subcarinate in the middle.

Female.—Length 9.5–10.5 mm.

Resembling the worker major. Head broader than the thorax. Body black; mandibles, antennæ and legs reddish brown; wings rather strongly suffused with yellowish-brown; veins and stigma pale yellowish-brown.

Male.—Length 6.5–7.5 mm.

Head about as broad as long, with straight, subparallel cheeks and broader, rounded postocular region. Anterior border of clypeus nearly straight, without a median notch. Mandibles without large punctures. Body black, shining; antennal funiculi, mandibles, articulations of the thorax and legs reddish or brownish. Pubescence very dilute and inconspicuous; hairs long, sparse, almost absent on the head and thorax, most abundant on the gaster. Wings like those of the female.

C. fallax is readily distinguished from our other species of *Camponotus* by its smaller size and the distinct notch in the anterior border of the clypeus in the worker and female phases. In the southwestern states there are several other species (*sayi* Emery, *hyatti* Emery, *texanus* Wheeler and *schaefferi* Wheeler) which are very closely related to *fallax*, but differ in size or coloration or in the structure of the thorax. Emery also enumerates as belonging to the *fallax* group, *C. tetricus* Pergande and *nitidus* Norton of Mexico; the Mediterranean species *sicheli* Mayr, *lateralis* Oliv., *gestroi* Emery, *universitatis* Forel and *interjectus* Mayr of Turkestan.

The habits of the European *fallax* are described by Forel in his "Fourmis de la Suisse" as follows:

"*C. marginatus* [*fallax* Nyl.] lives in small formicaries and is very timid. Roger, too, says that it is very timid and adds that it is found throughout Germany on old oaks. I have seen only four nests. The first was found near Zürich at the end of a dead oak branch about 10.5 m. above the ground. The tree had been recently felled so that I was able to study the nest at my leisure. The dead branch was scarcely 5-6 cm. in diameter and the dead wood had acquired a somewhat corky consistency. There was no hole at the broken end, but there were two oval openings on the side near the end of the branch. Two galleries, starting from these holes, united with each other at a depth of 4 cm., whence a sinuous central gallery ran back through the axis of the branch to a depth of about a decimeter and terminated in three ampullæ in the form of chambers, whose inner surface was not more than two square centimeters. During its course this gallery sent off scarcely more than three or four short lateral galleries, each of which also ended in a chamber. The chambers and galleries were somewhat flattened in the same plane, that is to say, their transverse section was generally elliptical. This was the entire nest of these ants, a nest containing about 150 workers and their larvæ. A second nest of the same size and very similar construction was found at Vaud wholly in the corky layer of the bark of a huge walnut, near the roots. A third nest was also found near Vaud in an old post. I believe that it had been established by the workers, which were still bringing to it their larvæ and companions. They were descending an old pear tree which had evidently been their former residence. I did not open this nest. The fourth and largest nest of *marginatus* which I was able to examine was in the garden of the insane asylum at Vienna in one of the larger dead branches of a *Paulownia*. This branch was two decimeters in diameter. The ants had three exits, first, a main opening which was made on the cut side of a secondary branch (dead also, of course), second a smaller opening in an abrasion in the bark of the main branch, distant about a meter from the first, and a third, very small opening corresponding to the central or pith cavity of a small, broken twig, which came off directly from the main branch between the two other orifices. As the tree was felled soon after I had discovered this nest, I broke up the branch and was able to examine both the nest and the colony. The latter, consisting of workers, females, males

and larvæ, may have comprised about a thousand individuals. The nest was composed first of the central, cylindrical cavity of the main branch, corresponding to the pith cavity, and second, of concentric stories corresponding to the layers of the wood. Each of these stories was very low but very extensive and formed a single great labyrinthine hall rather than a number of separate chambers. The stories communicated with one another and with the central cavity and outer openings only by means of narrow passages. Strange to relate, the nest was concentrated in the median layers of wood, the outer layers being perforated only by the galleries of exit, the principal one of which opened, moreover, through the central cavity on the cut surface of the secondary branch. All the wood which served the ants for protection was very hard." Several European authors mention the occurrence of *C. fallax* also in hard, woody oak galls.

In 1879 Forel broached the question as to whether the American forms of *fallax* have the same habits as the European type of the species. From many personal observations, especially on the forms *nearcticus*, *minutus*, *pardus*, *rasilis* and *discolor*, and from notes of correspondents on other forms, I am able to answer Forel's question in the affirmative. Our forms are all very timid ants, living in small communities in galleries and chambers which they excavate in dead wood and according to the same pattern as those described by the Swiss myrmecologist. Usually the wood of standing trees is preferred by the ants, probably because this is in the immediate vicinity of their food supply, which consists very largely of the excreta of aphids and coccids on the leaves and bark. The oak is a favorite tree in America just as it is in Europe, probably because in addition to nourishing a large number of *Kermes* and other phytophthorous Homoptera, its leaves and galls give off a sweet secretion in very small droplets that can be lapped up by the ants. The cavities of the hard galls of *Holcaspis*, which cling long to the oak twigs, are favorite nesting places, especially for incipient colonies of the forms *discolor* and *rasilis* which abound on the live oaks (*Quercus virginiana*) of Texas and the other Gulf States. In the northern states *nearcticus* is also fond of oaks and chestnuts, but in the warm pine barrens of southern New Jersey, it is quite common in dead branches of the pitch pine (*Pinus rigida*) or in its old cones that have fallen

to the ground. Even the stalks of the common elder (*Sambucus canadensis*) are sometimes tenanted, but the more woody bushes and trees are preferred. Near the roots of oaks I have found colonies of *rasilis* under stones, but these colonies may have been occupying merely temporary nests.

When kept in artificial nests, our forms of *fallax* are as stupid and monotonous in their behavior as the European form observed by Forel. The ants huddle together in one of the chambers and show little inclination to move about, even when the weather is warm. Besides feeding and caring for their young, they show little interest in their environment or in one another.

The North American forms of *fallax* may be arranged in two series, one of which has the cephalic sculpture and pilosity of the European type, *i. e.*, with the head and especially the cheeks of the workers and females covered with small, rather shallow foveolæ which bear very minute, inconspicuous and appressed hairs, whereas the other comprises forms in which the cheeks and clypeus have deeper and more elongate, comma-shaped foveolæ, each bearing an erect hair, or bristle, so that the anterior portion of the head is rough and hirsute. Each of these series presents a number of color variations grading from black forms to those in which the body, with the exception of the whole or a portion of the gaster, is yellow or red, and these color gradations seem to run parallel with each other in such a manner that a subspecies or variety with a particular type of coloration and with piligerous foveolæ corresponds with a form of similar coloration but without piligerous foveolæ. This is shown in the following table which begins with the darkest and ends with the palest forms:

With piligerous foveolæ:	Without piligerous foveolæ:
<i>cnemidatus</i>	<i>nearcticus</i>
<i>paucipilis</i>	<i>minutus</i>
<i>clarithorax</i>	<i>tanquaryi</i>
	<i>pardus</i>
	<i>decipiens</i>
<i>subbarbatus</i>	<i>rasilis</i>
<i>discolor</i>	<i>parvidus</i>

This table also roughly indicates the distribution of the various

forms. *C. nearcticus* is the most abundant and with *minutus* usually the only form to be found in the northern states and southern British America. Though recorded from Florida it is certainly rare and sporadic in that state. The pale *rasilis*, *pavidus* and *discolor* are, on the other hand, the prevailing and most abundant forms in the Gulf States. In the intermediate region, notably in the Mississippi Valley and central Atlantic states, we find *decipiens*, *subbarbatus*, *tanquaryi* and *pardus*, which have an intermediate coloration.

Since the various subspecies and varieties of *fallax* are based on the stature, sculpture, pilosity and coloration of the major worker and female, it is often difficult to identify single minor workers; and male specimens, unaccompanied by workers or females, cannot, with certainty, be referred to their respective subspecies and varieties. As an aid in identifying the major workers of the North American forms that have been recognized up to the present time I subjoin the following table:

1. Cheeks and clypeus with elongate, piligerous foveolæ.....8
Cheeks and clypeus without such foveolæ.....2
2. Body black, thorax at most only partially red, average length 6.5 mm.
var. *nearcticus* Emery.
Of a different color3
3. Both head and thorax reddish-brown or yellowish-red.....6
The head largely dark brown or black.....4
4. Average length 5.5 mm.5
Average length 7 mm.var. *tanquaryi* var. nov.
5. Thorax dark red, head and gaster black.....var. *minutus* Emery.
Thorax ivory yellow, spotted with brown, base of gaster often banded with
yellowvar. *pardus* var. nov.
6. Average length 6-6.5 mm.7
Average length 8 mm.subsp. *rasilis* subsp. nov.
7. Gaster yellow at the base.....var. *pavidus* var. nov.
Gaster black throughoutvar. *decipiens* Emery.
8. Piligerous foveolæ few on the cheeks, usually absent on the clypeus.....9
Both cheeks and clypeus with numerous piligerous foveolæ.....10
9. Yellowish-brown, gaster paler, with brown bands. subsp. *subbarbatus* Emery.
Brownish-blackvar. *paucipilis* Emery.
10. Head blackish-brown11
Head and thorax yellowish-red.....subsp. *discolor* Emery.
11. Thorax blackishvar. *cnemidatus* Emery.
Thorax redvar. *clarithorax* Emery.

1. *Camponotus fallax fallax* Nyl. var. *nearcticus* Emery.

C. marginatus Latr. var. *nearcticus* Emery, Zool Jahrb. Abth. f. Syst. VII,

1893, p. 675 ♀♀; Wheeler, Bull. Amer. Mus. Nat. Hist. XXI, 1905, p. 403; Occas. Papers Bost. Soc. Nat. Hist. VII, 7, 1906, p. 24.

Worker major.—Length 5.5–7.5 mm.

Very similar to the specific type from Western Europe but averaging smaller. Body shining; finely shagreened, more coarsely on the head and thorax, which therefore appear a little more opaque than the gaster. Clypeus subopaque, sometimes subcarinate in the middle. Front and sides of head with small and rather shallow, scattered foveolæ. Thorax evenly arched above, moderately broad in front, laterally compressed behind; pronotum flattened above, with a faint median impression; epinotum with feebly convex base and concave declivity, passing over into each other through a rounded angle. Petiole slightly narrower than the posterior end of the epinotum, compressed anteroposteriorly, with feebly convex anterior and posterior surfaces and rather sharp, entire upper and lateral border.

Pubescence scattered, indistinct except on the gaster. Hairs long, very sparse. Cheeks and clypeus without erect hairs. Scapes and legs naked.

Black; cheeks, mandibles, legs, antennæ, petiole, articulations of the thorax and petiole and sometimes also the pronotum deep reddish-brown. In some specimens the clypeus is also more or less reddish, the scapes, middle portions of the femora and tibiæ more or less blackish.

Worker minor.—Length 4–5.5 mm.

Differing from the worker major in the shape and smaller size of the head, the more pronounced clypeal carina, proportionally longer antennæ, less arcuate thorax and the absence or very feeble development of the foveolæ on the anterior portion of the head.

Female.—Length 8–9 mm.

Like the soldier except in the structure of the thorax. Wings tinged with yellowish or brown; veins and stigma yellowish.

Male.—Length 5.5–7 mm.

Clypeus carinate, with straight, entire anterior border; cheeks straight, subparallel, about as long as the eyes; head behind the eyes broad and rounded. Body shining; anterior portion of the head without foveolæ. Erect hairs sparse, absent except on the clypeus and gaster. Color black, appendages sometimes more or less reddish, with pale articulations. Wings like those of the female.

Emery mentions this form as occurring in New York, District of Columbia, Pennsylvania, Florida and California. I have examined a large number of specimens from the following localities:

New York: West Farms (J. Angus); Niagara Falls; Brooklyn, in maple tree; Staten Island (W. T. Davis); Ithaca and Albany (N. Y. State Coll.).

New Jersey: Lakehurst, in branches and dead cones of *Pinus rigida* (Wheeler); Clementon (J. C. Bradley); Cumbridge County and Boonton (H. Viereck).

Pennsylvania: St. Vincent (Jerome Schmitt); Harrisburg, Tinicum Island and Camhill (H. Viereck).

Connecticut: Colebrook (Wheeler).

Massachusetts: Chestnut Hill, Boston (Wheeler); Nahant (Möring); Cambridge (J. G. Jack); Essex County and Springfield (G. B. King); Warwick (Miss Edmonds).

Rhode Island: Providence (Davis).

Illinois: Rockford (Wheeler); Urbana (J. L. Pricer).

Wisconsin: White Fish Bay (C. E. Brown).

Nebraska: Crete (Wheeler).

Washington: Olympia (F. Kincaid).

Idaho: Market Lake (J. M. Aldrich).

Oregon: Corvallis (Amer. Mus. Nat. Hist.).

California: Shasta County.

Texas: Toronto, Brewster County (Wheeler).

Florida: Atlantic Beach (Mrs. A. T. Slosson).

British America: Toronto, Canada (R. J. Crew).

Examination of workers of the typical *fallax* from Austria, Bulgaria, France and the Crimea convinces me that Emery was right in regarding this variety as distinguishable from the European type only in the smaller average stature of the workers and female. The maximum size of the worker major of the typical *fallax* is given by Mayr and Forel as 9 mm.; the female is said by Emery to average 10 mm.

2. *C. fallax fallax* var. *minutus* Emery.

? *Formica americana* Buckley, Proc. Ent. Soc. Phila., VI, 1866, p. 154. ♀♀.

Camponotus marginatus var. *minutus* Emery, Zool. Jahrb. Abth. f. Syst., VII, 1893, p. 676, ♀♀; Wheeler, Bull. Amer. Mus. Nat. Hist., XXI, 1905, p. 403; Occas. Papers Bost. Soc. Nat. Hist., VII, 7, 1906, p. 24.

Worker major.—Length 5.5–6 mm.

Differing from *nearcticus* in its smaller size and in having the thorax and petiole red or yellowish, sometimes darker behind. The legs and antennæ, too, are paler, the mandibles, sides and lower surface of the head red or brown. Petiole convex in front, flattened behind.

Worker minor.—Length 3.5–5 mm.

Very similar to the worker major in color and sculpture. Petiole with blunter margin.

Female.—Length 6.5–7.5 mm.

Like the worker major; thorax red, with the scutellum and a large antero-medial blotch and two elongate parapsidal blotches on the mesonotum black. Pronotum clouded with fuscous or black. In some specimens the dark mark-

ings on the upper surface of the thorax are more or less confluent. First and second gastric segments each often with a broad, red or yellowish, transverse band above. Antennæ red, funiculi infuscated towards their tips. Legs red or yellowish.

Male.—Length 6–6.5 mm.

Indistinguishable from the male of *nearcticus* except, perhaps, by its slightly smaller average stature.

The types of this variety came from the District of Columbia, Maryland, Missouri and New Jersey. I have examined specimens from the following localities:

New Jersey: Great Notch and Cumbridge County (H. Viereck); Ramapo Mts. and Lakehurst (Wheeler and W. T. Davis).

New York: Jamaica, L. I. (N. Y. State Coll.).

Pennsylvania: St. Vincent (Jerome Schmitt).

Massachusetts: (Geo. B. King).

Illinois: Rockford (Wheeler).

British America: Canada (J. G. Jack); Vancouver (Mus. Comp. Zool.).

This variety, which is merely a paler and depauperate form of *nearcticus*, is extremely variable in color. A number of worker specimens in my collection from Bronxville, N. Y., have two dark spots on the pronotum and have the epinotum more or less infuscated above. They form a transition to the next variety. A series of forms taken by the Rev. Jerome Schmitt at St. Vincent, Pa., and comprising all four phases, have the larger stature of *nearcticus* with the coloration of *minutus*. Some of the females of this series have the thorax entirely black above, others have the characteristic maculation of *minutus*. The workers, too, are highly variable in color.

3. *C. fallax fallax* var. *pardus*, new variety.

C. marginatus subbarbatus Wheeler, Bull. Amer. Mus. Nat. Hist., XXI, 1905, p. 403.

This form has the small dimensions of *minutus* but the thorax, legs and antennæ of the worker major and minor are ivory yellow, the thoracic dorsum with dark brown spots, the legs and antennæ variegated with brown. The head has the anterior portion brownish, the cheeks, clypeus and mandibles ivory yellow. In some major workers the yellow runs back some distance in clouds between the eyes and the frontal carinæ. In many specimens the middle portions of the first and second gastric segments are more or less yellowish. The female measures 8 mm. and has the thorax, petiole and legs clay yellow; the thorax has the black markings of the *minutus* female, with

two yellow spots on the scutellum. The tarsi and ends of the tibiae and femora are brown. The anterior portion of the head is red or yellow, the antennae dark red. The male is indistinguishable from that of *minutus*.

Described from numerous specimens of all four phases from the following localities:

New York: Bronxville, Mosholu and White Plains, nesting in hollow stems of elder and dead oak branches (Wheeler); West Farms (J. Angus); Jamaica, L. I. (G. von Krockow).

New Jersey: Lakehurst (Wheeler); Riverton (E. Daecke); Westville (Jerome Schmitt).

The coloration of this variety is highly variable even in the same colony. Some of the major workers have the gaster entirely black, while others have the two basal segments largely yellow. The maculation of the thorax is also rather inconsistent. Workers from one colony taken at Lakehurst, N. J., have the spots very indistinct and the head brown or yellowish like the thorax, so that they seem to form a transition to the var. *decipiens*. The specimens from New York and New Jersey referred to *subbarbatus* in my "Annotated List of the Ants of New Jersey," p. 403, belong to the variety here described.

4. *C. fallax fallax* var. *tanquaryi*, new variety.

Worker major.—Length 7-7.5 mm.

Head and clypeus black; cheeks, antennae and mandibles, except the teeth, deep red; apical half of antennal funiculi infuscated. Thorax varying from rich yellowish red to dark brown, legs paler. Gaster black, basal half of first segment and a narrow band across the base of the second segment yellow. Body shining; foveolae on the cheeks and sides of the head numerous and distinct.

Worker minor.—Length 4.5-6 mm.

Differs from the major worker in having the mesothorax and epinotum black or infuscated. Petiole dark red or brown; yellow bands on gaster more restricted and less conspicuous or almost absent.

Female.—Length 7.5-8.5 mm.

Differing from the major worker in having the epinotum and upper surface of the thorax dark brown or black, the pleurae more or less spotted with brown or brown throughout, the legs dark brown and the band on the second gastric segment faint or lacking. In some specimens the first segment is entirely black. Wings colorless, with yellowish veins and stigma.

Male.—Length 5-5.5 mm.

Differing from the males of the preceding varieties only in having the legs somewhat more reddish, except the middle portions of the femora and

tibiæ, which are black. Wings colorless, with dilute yellow veins and stigma. The head, thorax and petiole have a few long, erect hairs and those on the gaster are rather abundant.

Described from a number of specimens of all four phases belonging to a single colony captured by Mr. Maurice Tanquary in an old stump near Urbana, Ill. In coloration, though not in size, this variable form seems to represent a transition between *minutus* and *decipiens*.

5. *C. fallax fallax* var. *decipiens* Emery.

C. marginatus var. *decipiens* Emery (in part), Zool. Jahrb. Abth. f. Syst., VII, 1893, p. 676, ♀♀.

Worker major.—Length 5.5–7 mm.

Head, thorax, petiole and appendages brownish-red; gaster black, with pale yellow margins to the segments. In some specimens the middle of the head and anterior border of the cheeks are dark brown. Sculpture and pilosity as in the preceding varieties.

Worker minor.—Length 4.5–5 mm.

Resembling the worker major in color but the posterior portion of the head is often deep red or brown and the petiole is more or less infuscated.

Female.—Length 8–9 mm.

Resembling the worker major. Scutellum, a large anteromedian and two elongate parapsidal blotches on the mesonotum, black or dark brown. Head sometimes infuscated in the middle behind. Wings yellowish, with yellow veins and stigma.

Male.—Length 6 mm.

Indistinguishable from the male of *nearcticus*.

I have seen specimens of this variety from the following localities: Indiana: Cotype worker minor (Emery).

Kansas: Douglas, in bee-hive with bee-moths (E. S. Tucker and Miss Clara Klaumann).

Colorado: Colorado Springs, running on trunk of cotton-wood (Wheeler).

Utah: Mill Creek (R. V. Chamberlin).

Emery also includes Texas among the localities, but the specimens which he cites from this state really belong to a distinct and larger though very similar form, which is described below as subsp. *rasilis*. The type locality of *decipiens* is therefore Indiana. The specimens from Mill Creek, Utah form a transition to *rasilis*, because the females and workers are decidedly larger than those of the typical *decipiens*.

6. *C. fallax rasilis*, new subspecies.

C. marginatus var. *decipiens* Emery (in part), Zool. Jahrb. Abth. f. Syst., VII, 1893, p. 676, ♀♀.

Worker major.—Length 7.5–9 mm.

Resembling the var. *decipiens* in color but decidedly larger. Head, thorax, petiole, antennæ and legs rich yellowish red; gaster black, extreme base of first segment and sometimes the venter deep red; mandibles sometimes red, teeth black, anterior margins of cheeks and clypeus somewhat infuscated. Antennal funiculi red throughout.

Worker minor.—Length 4–6 mm.

Colored like the worker major but the lighter portions are often more yellowish.

Female.—Length 9.5–10.5 mm.

Colored like the worker major; margin of the scutellum and sometimes also the metanotum blackish. Wings yellowish, with yellow veins and stigma.

Male.—Length 6.5–7 mm.

Closely resembling the males of the preceding varieties; gastric segments narrowly yellowish at the base; antennal funiculi brown; articulations of the legs yellowish; wings as in the female.

My series of specimens represents the following localities:

Texas: Austin, New Braunfels, Marble-Falls, and Granite Mt. in woody galls of *Holcaspis cinerosa* on *Quercus virginiana*; also in logs and branches of the same tree (Wheeler); Barksdale (Brown); Victoria, in twigs of willow (W. D. Hunter and J. D. Mitchell); Langtry (Wheeler); Kerrville (F. C. Pratt), Llano (J. C. Crawford), Tyler (R. C. Howell), Calvert (C. R. Jones).

Arizona: Tucson (Wheeler).

Louisiana: Keatchie (W. Newell).

Florida: Miami (Wheeler); Sanford (Jerome Schmitt).

I regard this form as a distinct subspecies on account of its large size and the constancy of its coloration. This constancy is the more noteworthy because it is one of the most abundant ants in portions of the Southern States.

7. *C. fallax rasilis* var. *pavidus*, new variety.

Worker major.—Length 6–7 mm.

Coloration of head, thorax, petiole and appendages as in *rasilis* but the base of the gaster clay yellow. In most specimens the first and second segments are of this color throughout but in others only the base of the first segment is yellow and the remainder of the gaster is black. Antennal funiculi scarcely infuscated towards their tips.

Worker minor.—Length 4–5 mm.

Colored like the major worker and exhibiting the same variations.

Female.—Length 8.5 mm.

Colored like the major worker; thorax yellowish-red throughout, only the border of the scutellum being somewhat infuscated. In one specimen the

posterior border of the second gastric segment is black; in another only the base of the second segment is yellow. Wings very faintly tinged with yellow, with dilute yellow veins and stigma.

Described from specimens taken in the following localities:

Texas: Victoria, in twig galls on burr oak (J. D. Mitchell); Dallas (Schwarz, Pratt and Hunter); Calvert (C. R. Jones); Liberty (E. S. Tucker); Austin, running on the bark of *Salix nigra* (Wheeler).

Louisiana: Logansport, on *Cratægus* (E. S. Tucker).

Florida: Jacksonville and Atlantic Beach (Mrs. A. T. Slosson).

While this variety is easily distinguished from *rasilis* by its smaller size and in having the base of the gaster yellow in the female and workers, there is nevertheless considerable variation in the latter character. The ergatotypes from Victoria, Texas, and the gynetype from Calvert, Texas, have the two first gastric segments entirely yellow. A series of workers from Austin has only the base of the first segment yellow. The specimen from Atlantic Beach, Fla., a female, is much larger than the type and measures 9.5 mm. It has a black margin to the first gastric segment and the second is reddish only at the base. This specimen may, therefore, be regarded as representing a transition to the true *rasilis*.

8. *C. fallax subbarbatus* Emery.

C. marginatus subsp. *subbarbatus* Emery, Zool. Jahrb. Abth. f. Syst., VII, 1893, p. 676, ♀ ♀ ♂.

Worker major.—Length 6–6.5 mm.

Head and thorax finely and densely punctate and more opaque than in any of the preceding forms. Gaster superficially shagreened and shining. Cheeks with a few elongate foveolæ each bearing a short, stiff hair. Clypeus with few or no foveolæ. Head and thorax dirty, brownish yellow, pleuræ and posterior portions of head and thorax somewhat darker and more ferruginous. Gaster black or dark brown; first and second segments each with a very broad transverse broad band. In some specimens the first segment is yellowish or brownish throughout.

Worker minor.—Length 3.5–6 mm.

Coloration and sculpture as in the worker major. Piligerous foveolæ of the cheeks very few and indistinct.

Female.—Length 8–9 mm.

Head and thorax varying from reddish-brown to blackish. A large antero-median and two elongate parapsidal blotches on the mesonotum, the meso- and metapleuræ, scutellum and epinotum blackish. Petiole and gaster black or dark brown, the latter with the anterior and posterior margins of the three

basal segments yellow. Antennæ brown throughout; legs paler and more yellowish. Wings rather strongly suffused with yellow; veins and stigma brownish-yellow. Head and pleuræ subopaque, finely and densely punctate; elongate piligerous punctures on the cheeks and clypeus like those of the worker major. Thoracic dorsum and gaster shining.

Male.—Length 5–5.5 mm.

Head and thorax densely and finely punctate and less shining than in any of the preceding forms; cheeks and gula, as well as the gaster and upper surface of the head and thorax with rather long, scattered hairs. Black; antennal funiculi, tarsi and articulations of legs brown. Wings colored like those of the female.

The types are from the District of Columbia. I have seen specimens of all four phases from the following localities:

Virginia: (Emery).

New Jersey: Cumbridge County (H. Viereck); Lakehurst (Wheeler).

Illinois: Urbana (J. L. Pricer).

California: Los Angeles (Emery).

9. *C. fallax subbarbatus* var. *paucipilis* Emery.

C. marginatus subsp. *subbarbatus* var. *paucipilis* Emery, Zool. Jahrb. Abth. f. Syst., VII, 1893, p. 677, ♀♂.

This variety, which I have failed to recognize among my specimens, is described by Emery as follows:

"A few workers from Washington, D. C. have the color and shining surface of *nearcticus*, but a very few bristle-bearing foveolæ on the cheeks. A male accompanying these workers resembles *nearcticus* more closely than *subbarbatus*.

"Mr. Pergande writes me that this form always occurs on living oaks, whereas the former occur only on dead trees."

10. *C. fallax discolor* Buckley.

Formica discolor Buckley, Proc. Ent. Soc. Phila., VI, 1866, p. 166, ♀♀.

Camponotus marginatus var. *discolor* Mayr, Verh. Zool. bot. Ges. Wien., XXXVI, 1886, p. 365; Dalla Torre, Catalog. Hymenopt., VII, 1893, p. 242.

C. marginatus subsp. *discolor* Emery, Zool. Jahrb. Abth. f. Syst., VII, 1893, p. 277, ♀♀♂♂; Wheeler, Trans. Tex. Acad. Sci., IV, 2, 1902, p. 7.

Worker major.—Length 6.5–7.5 mm.

Color the same as in *rasilis*. Antennal funiculi often infuscated towards their tips. Surface shining, head more opaque in front, finely and densely punctate; mandibles, cheeks and clypeus with numerous elongate foveolæ bearing short, stubby hairs. Mesonotum convex, epinotal angle in profile much rounded. Petiole thick, strongly convex in front, flattened behind, upper border sometimes with a faint median impression.

Worker minor.—Length 3.5–5.5 mm.

Resembling the worker major in color and sculpture, but the head is more shining in front and the piligerous punctures on the cheeks and clypeus are less numerous and conspicuous.

Female.—Length 9.5–10 mm.

Like the worker major, but the mandibles, cheeks and clypeus seem to be even more densely covered with piligerous foveolæ. Metanotum and scutellum entirely black, or the latter is merely bordered with black. There is a small black spot at the insertion of each pair of wings. Tibiæ and tarsi sometimes brownish. Wings strongly suffused with yellow, with brownish-yellow veins and stigma.

Male.—Length 5.5–8 mm.

Resembling the male of *subbarbatus* but the thorax and head, except in front, are more shining, and the mandibles, cheeks and clypeus have longer and more numerous foveolæ and bear more numerous hairs. Body black; antennal funiculi and tarsi brown; wings whitish with pale yellow veins and stigma.

The types of this subspecies came from Texas. I have seen many specimens from the following localities:

Texas: Austin and Delvalle in woody galls of *Holcaspis cinerosa* on *Quercus virginiana* (Wheeler); Clebourne (O. P. Eastwood); Paris (Miss Augusta Rucker). Esperanza Ranch, Brownsville (C. Schaeffer), Llano (J. C. Crawford), Dallas (Jones & Hood); Corpus Christi (Jones & Pratt); San Antonio (F. C. Pratt).

Oklahoma: Ponca City (A. C. Burrill).

Missouri: Doniphan (Jerome Schmitt).

Illinois: Algonquin (W. A. Nason).

The habits of this form are the same as those of *rasilis*. It occurs in the same localities and sometimes on the same trees. It is constant in coloration and in possessing the elongate piligerous foveolæ on the cheeks and clypeus in all four phases.

11. *C. fallax discolor* var. *clarithorax* Emery.

C. marginatus subsp. *discolor* var. *clarithorax* Emery, Zool. Jahrb. Abth. f. Syst., VII, 1893, p. 678, ♀♀♂♂.

Worker major.—Length 7–8 mm.

Head, mandibles, clypeus and antennæ uniformly chestnut brown or blackish; thorax yellowish-brown, sometimes darker behind; legs yellow; petiole dark brown; gaster black with yellowish margins to the segments. Head densely punctate or shagreened, subopaque, more shining behind; cheeks, clypeus and mandibles with distinct but more scattered elongate piligerous foveolæ than in *discolor*. Gula with numerous short hairs. Thorax somewhat more shining than the head but rather coarsely shagreened; gaster superficially

shagreened and therefore appearing more shining than any other portions of the body.

Worker minor.—Length 5–6 mm.

Closely resembling the worker major in color and sculpture, but the head is somewhat more shining in front and has fewer piligerous foveolæ on the cheeks and clypeus.

Female.—Length 8–8.5 mm.

Head black; antennal funiculi and mandibles, except their teeth, dark brown; thorax dark brown, pronotum, a large anteromedian and two elongate parapsidal blotches on the mesonotum, border of the scutellum, the petiole and the lower portions of the pleuræ, black. Legs yellow, tibiæ and tarsi brownish. Wings brownish, with pale yellowish brown veins and stigma. Sculpture and pilosity of the head as in the worker major.

Male.—Length 6–8 mm.

Resembling the male of *discolor*. Wings like those of the female.

This variety was first described from San Jacinto and Los Angeles, Cala. I have seen specimens from the following localities:

California: Los Angeles, worker minor cotype (Emery); Point Loma, San Diego, nesting in stems of manzanita (Percy Leonard); Whittier (A. H. Quayle); Felton, Santa Cruz Mts. and Three Rivers, (J. C. Bradley).

Illinois: Cherry Valley (Wheeler).

Pennsylvania: Beatty (Jerome Schmitt).

From the two latter states I have seen only a few major workers and these differ from the California forms in having the head more shining, but they are connected with the typical form by a soldier from Whittier, Cala., which has the head more shining than in the San Diego specimens, which are identical with the types.

12. *C. fallax discolor* var. *cnemidatus* Emery.

? *Formica atra* Buckley, Proc. Ent. Soc. Phila., VI, 1866, p. 160, ♀.

Camponotus marginatus subsp. *discolor* var. *cnemidatus* Emery, Zool. Jahrb. Abth. f. Syst., VII, 1893, p. 678, ♀.

This variety, which I have not seen, was based on worker specimens collected by Mr. Theo. Pergande at Washington, D. C. These resembled *clarithorax* in sculpture but were "piceous black throughout, with the mandibles, antennæ, tarsi, tibiæ and articulations of the legs reddish brown."

SYNONYMIC AND DESCRIPTIVE NOTES ON THE CHALCIDOID FAMILY MYMARIDÆ.

BY A. A. GIRAULT.

URBANA, ILL.

There can be no doubt in regard to the family Mymaridæ that more attention will have to be given to minor descriptive details in order that the different species may be recognized; the characters heretofore used, especially that of body coloration, are certainly too indefinite for separation of the species and the cases of a number of the larger genera of the family may be cited to show that this is true. The various species of these genera are barely recognizable at this time; and this is so because the several descriptions are based on coloration alone which happens to be inconsequential in these particular groups. The species of the genera, large in regard to size such as *Polynema* Haliday, bear a number of differentiating characters of specific value in the sculpturing of the body but with the exception of one or two nearly all of them are similar or indistinguishable in regard to general coloration of the body. In other genera the several species are apparently similar both in regard to general coloration and the sculpturing of the body, and in these cases the only characters of specific value are found in the wing ciliation and in the relative size and shape of antennal joints. It is useless, therefore in both of these classes of genera to describe species as we have been in the habit of doing, namely, by describing their color alone for certainly, here, no other than the author of species will ever be able to recognize the species so described, and he himself not without difficulty.

In view of what has been stated, the following descriptive notes are offered as contributory knowledge of the morphology of several of the genera and species and also as an example of the method necessary for separation of the species. The great difficulty in accurately describing some of these minute and delicate forms, the necessity of making descriptions in most cases immediately after the specimens have been collected and the lack of essential knowledge concerning our native species are other reasons for enlarging on the descriptive work already done.

Family EULOPHIDÆ.

Subfamily APHELININÆ.

Tribe Aphelinini.

Genus Prospaltella Ashmead.

1. *Prospaltella perspicuipennis*, new species.

Normal position.

Female.—Length, 0.70 mm. Moderate in size for the genus. Wings hyaline, legs not banded, body black and yellow, fore wings with a naked area under the stigmal vein, with a slight indication of a postmarginal vein and the upper (cephalic) margin of the stigmal vein nearly parallel with and near to the cephalic wing margin, somewhat as in *similis* (Masi) but the space between the wing margin and the cephalic margin of the stigmal vein is very much narrower, a mere incision. Stigmal vein acute, pointing distocephalad.

General color brownish-black: whole of the scutellum, legs and the antennæ uniformly lemon yellow, excepting distal club joint which is darker and the extreme tips of the distal tarsal joints; mesal margin of axillæ, caudal third of parapsides, caudal and lateral margins of mesoscutum, meso-caudal margins of the eyes (less distinctly so), metanotum and mesopost-scutellum sordid or brownish-yellow; tegulæ dusky, venation pallid dusky yellowish. Eyes and ocelli garnet or dark red, the former with whitish pubescence. Both wings hyaline. The lemon yellow scutellum conspicuous against the darker background of the body in life.

Sculpture of body consisting of fine polygonal figures. Ocelli normal, the lateral ones are as far apart from one another as each is distant from their respective eye margin, the three in a short, nearly equilateral triangle, distant from the eyes; ovipositor slightly exserted, yellow.

Fore wings moderately narrow, widest at their distal fifth far distad of the venation, the marginal fringes short, excepting distad along the caudal margin where they are longest abruptly, there equal to a length slightly less than half the greatest wing width. Discal ciliation uniform, not dense, absent proximad of the base of the marginal vein and in a conspicuous rounded naked area caudad and distad of the stigmal vein; across the widest portion of the wing, the discal cilia are arranged in about from 8 to 11 rows; marginal and submarginal vein subequal, the marginal vein much broader, uniform in width and ending abruptly in two short, unequal branches separated by a narrow portion of the wing surface; the cephalic of these is very short, indicating a post-marginal vein; the caudal branch is about three times longer, forming a short wedge-shaped stigmal vein whose caudal margin is flat, short, continuous with that of the marginal vein, whose apical or discal margin is longest, obliquely truncate and whose cephalic margin is similarly inclined but pointing still more distad, curving proximad, cephalad, then slightly distocephalad to form the very slight post-marginal vein. Tegula bearing a single seta from its surface. Posterior wings normal, the blade short, long wedge-

shaped and devoid of discal cilia with the exception of a short row of scattered cilia extending from the extreme base of the blade distad to its caudal margin at about its center,* and a row of somewhat smaller cilia along the cephalic margin of the blade, from the apex of the marginal vein to the apex of the wing; marginal fringes absent along the cephalic margin just distad of the marginal vein, then originating and continuing around the entire blade margin, very short at first, slightly lengthening distad to the apex, then longer at apex and around at the caudal margin abruptly lengthening, becoming longer than the greatest width of the wing (across the apex of the marginal wing); they continue of nearly equal length along the caudal margin.

Antennæ regularly clavate, uniformly clothed with short, soft pubescence, 8-jointed-scape, pedicel, three funicle joints and a 3-jointed club, the latter distinct. Scape slender, nearly as long as the club, longer than the funicle, the scape, club and flagellum (including pedicel) being subequal regions; pedicel obconic, short, but longer than the first funicle joint, but not very much longer; flagellum gradually increasing in width, the joints of the funicle and club gradually increasing in length; proximal joint subquadrate, a fourth shorter than the following joint and nearly a third shorter than the pedicel, barely longer than wide; second funicle joint longer and slightly wider than the first but a third shorter and a fourth narrower than the third funicle joint, more equal to the pedicel than any other antennal joint; third joint of the funicle but very slightly shorter than the proximal club joint, but distinctly narrower, longer than the pedicel; second and third funicle joints distinctly longer than wide; all club joints distinctly longer than wide, the proximal two subequal in length, slightly longer than the third or distal funicle joint, the intermediate joint, however, broader than the first club joint, nearly rectangular and the broadest antennal joint; distal club joint conical, slightly longer, the longest flagellar joint, as wide at its base as the apex of the intermediate club joint; its apex obtuse but pointed, not sharply or acutely so.

From two specimens, $\frac{3}{8}$ -inch objective, 1-inch optic, Bausch and Lomb.

Male.—Unknown.

The species has the fore wings of *Encarsia* but the antennal club is plainly 3-segmented.

Described from two female specimens (the colors and sculpture from life) captured on the panes of a window in an unused pigshed on a farm, August 27 and 31, 1909. The host is therefore unknown. A species characterized by the shape of the stigmal vein, the naked area in the discal ciliation of the fore wings caudad of the stigmal vein, the bright yellow scutellum, the indication of a post-marginal vein, the hyaline wings and the uniformly yellow, non-banded legs. It is nearest to *similis* (Masi) from which it is easily

* A few scattered very minute setæ caudad of this row, between it and the caudal wing margin.

separated by the structural differences in the stigmal vein. In Howard's (1908) table of the species of the genus, it would drop in near *similis* (Masi) or *koebckeii* Howard, differing from the latter in its black head, more clavate antennæ, naked area of the fore wings and details of antennal structures, as well as in the perfectly hyaline wings and the contrasting coloration of the scutellum with that of the rest of the mesonotum. An apparent typographical error is present in the first line of the table referred to (Howard, 1908, p. 281), namely, the words "pointed marginal vein" being printed instead of "pointed postmarginal vein." The error, however, is readily detected because of the fact that the marginal vein in the whole subfamily is usually very long and in the genus *Prospaltella* is as long as is normal.

Habitat.—Centralia, Illinois.

Type.—Accession No. 41,679, Illinois State Laboratory of Natural History, Urbana, Illinois, two females in xylol-balsam (two slides).

Family MYMARIDÆ.

Subfamily GONATOCERINÆ.

Tribe *Ooctonini*.

Genus *Camptoptera* Foerster.

1. *Camptoptera pulla* Girault.

Girault, 1909a, pp. 27-28, fig. 2.

This species recently described from several female specimens captured at Urbana, Ill., in July, 1908, proved to be common at Centralia, Ill., during the latter part of August and the first part of September, 1909, both sexes being captured, the female in numbers. The color of its body is really shining black in nature, appearing greyish black in balsam mounts. Otherwise its description is correct as given, excepting that the club joint is not narrowed as shown in the figure (Girault, 1909a, fig. 2) and with the exception of the shape of the abdomen which is ovate in lateral aspect in balsam mounts but in the dorsal aspect as has been described. The dilatation on the caudal margin of the fore wings near base is a regular sloping convexity, not acute or emarginate at any place on its margin; the coxæ are concolorous with the clay yellow legs; the eyes are reniform, very dark garnet, their surface coarse; abdomen smooth

and shining with sparse, soft, whitish pubescence dorsad and caudad; the thoracic pleura are finely lined, obliquely so; the head, thoracic venter and most of the remaining portions of the thorax similarly lined, the vertex transversely so, the scutellum impunctate, longitudinally finely lined (the metanotum has not as yet been seen); the mesoscutum, however, is somewhat rougher, with fine polygonal figures; surface of the eyes much coarser than the body surfaces. The parapsidal furrows are complete, widely separated at their bases, the caudal margin of the mesoscutum straight, that sclerite shorter than the scutellum which is large and slightly convex; for a few other general characters see the description of the male following. The pubescence of the funicle and club in the female antennae is obscure but the funicle joints have at least one whorl of fine hairs distad, more noticeable on joints 4 to 6 but there is also some pubescence farther proximad on the joints; the club bears a few long grooves.

The male, heretofore unknown, is described herewith.

Male.—Length, 0.75 mm.; slightly smaller than the female but otherwise the same excepting in antennal and abdominal characters or the secondary sexual characters usual to the genus.

Occipital margin of the vertex (dorsal aspect) concave, subacutely emarginate at the meson, its two oblique sides meeting there in a point; ocelli dark like the eyes, smooth, inconspicuous, situated in a mere curved line near the occipital margin, the lateral ocelli somewhat farther from the middle or cephalic ocellus than each is distant from their respective eye margin; also the distance between the lateral ocelli is at least thrice the distance between each and its respective eye margin; lateral ocelli slightly farther from the eye margins than they are wide and separated from them by a grooved line, a portion of the "vertexal carina" seen in balsam mounts.

Abdomen distinctly shorter than the thorax, (lateral aspect) triangular,* the dorsal plane acutely convex, very convex; (dorsal aspect) triangular, its base truncate, forming the base of the triangle, the second and third segments subequal, at least a third longer than segments 4 to 7 which are short, transverse, straight; terminal segment slightly longer, very small, conical. Antennae inserted dorsad of the middle of the face, slightly ventrad of a line drawn between the dorsal ends of the eyes (lateral aspect), widely separated, the bulbs being near the eye margins.

Antennae filiform, much longer than in the female and than the length of

* In balsam mounts quite differently shaped: ovate, very small, not any larger than the head and with the genitalia exerted. In balsam mounts the abdomen of the male resembles somewhat the female abdomen, lateral aspect, when similarly mounted.

the body, the funicle joints all cylindrical and long, none of them very unequal. Scape short, its ventral margin convex, its dorsal margin straight, subequal in length to the club joint, slightly longer than the first funicle joint; pedicel obconic, short and moderately stout, its truncate apex with serrulate margins, nearly as wide as the scape, the scape and the pedicel being the widest antennal joints, being about twice wider than the width of the flagellum; pedicel the shortest antennal joint, slightly more than half the length of the proximal funicle joint but longer than wide; the following joints all slender, much longer than wide; proximal funicle joint the shortest joint of the funicle, slightly shorter than the club joint, nearly twice the length of the pedicel, a third shorter than the next joint; following funicle joints all subequal in length, the second and third funicle joints tending to be equal and longest, the fourth slightly shorter and the fifth, sixth and seventh equal and still slightly shorter and the club joint equal to them or slightly shorter; it is at least as long as four times its own width and but very slightly conical distad, not differing very much from the preceding joint. Funicle and club with a few longitudinal grooves (high power), the corners of the distal ends of the funicle joints ending in acute spine-like processes. Pubescence fine and close, short, increasing distad but not dense.

Caudal wings and the fore wings with the usual row of discal cilia around their margins, originating between the insertions of the marginal fringes. Anterior tibial spur forked.

From four specimens, $\frac{3}{8}$ -inch objective, 1-inch optic. Bausch and Lomb.

The foregoing descriptive notes were made from a series of eighteen specimens captured at Centralia, Ill., on the panes of a small window in an unused pig-shed on a farm; all were captured at the same spot on these dates, 1909: August 25 (4 ♀'s), 26 (2 ♂'s, 3 ♀'s), 27 (1 ♀), 30 (1 ♀); September 1 (1 ♀), 2 (2 ♀'s) 4 (1 ♂) and 6 (1 ♂, 2 ♀'s).

I have since captured the following specimens: One female by sweeping, Urbana, Ill., July 1, 1910, and in the same locality on greenhouse windows also on the same date, one male and six females; some of these females were twice the size of the others and while the former were easily seen with the unaided eye, the latter were barely visible.

2. *Camptoptera metotarsa* Girault.

As shown later this species becomes the type of the new genus *Macrocamptoptera* Girault.

The genus *Camptoptera* has now three valid species—*papaveris* Foerster, *clavata* Provancher and *pulla* Girault. Of these the second is unrecognizable, its description too general.

Macrocamptoptera, new genus.

Type.—*Camptoptera metotarsa* Girault.

A genus similar to *Camptoptera* Foerster but larger and distinguished by the longer, slender scape, the lack of parapsidal furrows, the somewhat less noticeable abdominal petiole and the coarser body sculpturing. The type species is reconsidered herewith.

1. *Macrocamptoptera metotarsa* (Girault).

Camptoptera metotarsa Girault, 1905a, p. 91.

Camptoptera metotarsa Girault, 1909a, pp. 26-27.

An examination of the single type specimen of this species brings out the fact that it belongs to this new genus and that its original and revised descriptions are correct in all essential points. But in the table of species of the genus *Camptoptera* given in Girault (1909a, p. 28) in line 9 *joint 4 of funicle* is printed instead of *joint 4 of antenna*; the second funicle joint was intended. Also the species is more than 1.25 mm. in length, distinctly larger than the two known species of *Camptoptera*. The type is in bad condition, the abdomen broken from the rest of the body but the parts are in excellent condition for study, excepting that the antennal club is missing; the specimen is tag-mounted but the body is not shriveled. However, an antenna was successfully removed and mounted in balsam and also the wings and a fore leg and this mount plainly showed the previous descriptive notes to have been correct. From this mount and the other parts on the tag I have made the following notes which should be considered final. The unique type specimen is in the United States National Museum, Washington, D. C., mounted on a tag bearing the following labels: "Arlington, Va. VI, 28, 1905"; "A. A. Girault, collector."; "Quaintance No. 361."; "Type No. 8941."; "*Camptoptera metotarsa* Girault, ♀." Also a portion mounted in balsam on a single slide labelled "Hym. slide No. 112," U. S. National Museum, bearing a pair of wings, a fore leg and an antenna.

Abdomen with a short petiole. Body with distinct scaly sculpture. Parapsidal furrows absent; a rather deep ovate fovea on each side of the mesoscutum near the caudal margin at about where, or somewhat more laterad, the parapsidal furrows ordinarily are. Fore wing shaped as in *Camptoptera*; the marginal vein straight, moderately long, at least three times longer than wide; a paired, distinct row of discal cilia along the cephalic margin and a similar line along the caudal margin, both at the wing edge or near the insertions of the marginal fringes; the lines along the caudal margin are relatively

farther apart from each other, but the lines along both margins disappear just before the apex, that is, do not continue around the apical margin to meet each other. The apex of the fore wing is curved in one direction only, the caudal margin remaining straight to the point of the apex, the cephalic margin curving around to meet it, the curve oblique. In the fore wing as formerly described, there are two principal lines of discal cilia extending from the apex which are broken just proximad of the distal half of the wing blade, a naked space intervening, then continued proximad in short, straight lines of about five cilia each, ending some distance from the marginal vein. Also, in the fore wing, two other lines of discal cilia, making 4 in all, these two shorter and within the others, confused with them toward the apex and extending proximad not to the base of the distal half of the wing. Blade of the fore wing bordered with dusky yellowish. Dilatation proximad on the caudal margin of the fore wing a mere inconspicuous convexity; as in *Camptoptera* the marginal fringes have a distinct or white path around the wing margin just out from their insertions. Posterior wing linear, slightly enlarging distad, maculate with dusky, the caudal edge with a paired line of discal cilia; cephalic line with a single line of them. Tarsi 5-jointed. Antennæ with a long and slender scape, as long as the pedicel and first two funicle joints united; the first and second funicle joints slender, the latter longest, the pedicel not a half of its length and a third longer than the first funicle joint; third funicle joint and others distad gradually shortening, the third only half as long as the second funicle joint.

Tribe *Gonatocerini*.

Genus *Alaptus* Haliday.

1. *Alaptus iceryæ* Riley.

Girault, 1908a, pp. 186-187.

Normal position.

Female.—Length, 0.23 mm.; very minute; in life barely visible to the naked eye. Similar in general to the other species and as formerly described except as may be hereinafter mentioned.

General color uniformly grayish black, the thorax somewhat lighter: Antennæ concolorous, legs uniformly pallid, including the coxæ, the apical tarsal joint dusky only at its extreme tip; eyes and ocelli dark reddish; fore wings clear with a dusky yellowish border around the blade, the posterior wings as usual maculate with dusky. Venation pallid, very slightly dusky.

Body smooth, shining, impunctate, the pubescence sparse; parapsidal furrows complete; scutellum transverse. Abdomen ovate, sessile, about equal to the thorax in length, the ovipositor not exerted. Legs normal, the tibial spurs single, the anterior spurs large, curved and forked and the proximal tarsal joint of the anterior legs with the usual row of stiff bristles forming the antennal comb or strigil in conjunction with the curved and forked tibial spur; tarsal joints 3 and 4 subequal, the proximal two somewhat longer and subequal to each other and the fifth or distal joint somewhat the longest.

Fore wings normal to the genus, with a slight curve along the caudal margin at the distal fifth, widest slightly before (proximad of) the apex and across the proximal dilatation and tapering rapidly proximad from the apex until reaching the dilatation or excision on the caudal margin which is usual and which originating at a point opposite the apex of the marginal vein curves concavely to an acute point opposite the distal third of the marginal vein and then gradually descends by means of a longer inclination proximo-cephalad, reaching the original line of the caudal wing margin somewhat proximad of the origin of the marginal vein; the much longer declining side of the dilatation is entire with the exception of a slight emargination at its proximal fourth at about a point opposite to the origin of the marginal vein; the dilatation is keel-shaped and the wing is wider across it than at the apical wide portion of the blade. Just opposite the apex of the dilatation, along the cephalic margin of the wing at the distal third of the marginal vein there is a slight convexity. Blade of fore wing with the usual marginal cilia which are longest at the apex, especially caudad where they exceed the greatest width of the blade by at least three times; as usual these cilia are pallid at a point a short distance out from their origin, forming a clear path or border around the apex of the wing; discal cilia entirely absent with the exception of the usual row of them around the margins at the insertions or bases of the marginal cilia and in the center of the blade at its distal half one or two cilia, if the latter then both equal in size, not very widely separated and in the same line longitudinally; marginal cilia continuous to the apex of the marginal vein (cephalic margin) and (caudal margin) to the apex of the dilatation where they are comparatively very short; toward the proximal end of the blade of the fore wing a few cilia from the row of discal cilia on the margin may appear in the center of the blade. A single large seta arises from the marginal vein at the slight convexity and a small one more proximad at its proximal third; submarginal vein serrulate along its caudal edge for at least the distance of its distal half, narrow, much longer than the marginal vein which is about $4\frac{1}{2}$ times longer than broad.

Caudal wings normal, straight, clavate, its entire blade maculate as usual with dusky and the pallid or white bases of the marginal cilia at the apex of the wing form a whitish or clear border around that portion of it, the marginal cilia complete, longest at the extreme apex and caudad where they are at least 4 times longer than the greatest width of the wing, but not as long there as the longest marginal cilia of the fore wing, being about a fourth shorter; wing widest somewhat farther from the apex than in the case of the blade of the fore wing; discal cilia absent, save for a single longitudinal row of about 14 which proceeds from the base of the blade to the base of the distal seventh of the blade along the middle of it, nearer the caudal margin, terminating before the apex where the blade is widest and with its setæ smaller and closer together proximad than distad. Posterior wings as usual smaller, narrower and straighter than the fore wings.

Antennæ similar to those in *Alaptus cacilii* Girault but the proximal two

funicle joints are shorter, the first quadrate, the second barely longer than wide, whereas in *cacilii* they are distinctly longer than wide. Scape as in *eriococci*, shorter than the club, slightly longer than the united lengths of the three following joints, widest at its center but not especially widened; pedicel obconic, truncate apically, its apical margin serrulate, as wide as the scape but its apex at least a third narrower than the widest portion of the club, somewhat longer than the united lengths of the two following joints; proximal funicle joint abruptly smaller, quadrate, very slightly shorter than the next joint and the shortest antennal joint; funicle joint 2 slightly longer than wide, from a third to a fourth shorter than the following joint or funicle joint 3, equal in width to funicle joint 1 and somewhat narrower than funicle joint 3 which is cylindrical ovate and equal in length to the following joints or slightly longer; funicle joint 4 rounded ovate, wider than joint 3 and the distal funicle joint still larger and globular, about thrice the size of the proximal funicle joint; club large, ovate, as long, or nearly, as the 4 joints preceding; the club is much larger than the scape and the broadest of the antennal joints; it bears the usual two longitudinal carinæ. Pubescence of the funicle joints arranged as in *globosicornis* Girault.

From three specimens, $\frac{3}{8}$ -inch objective, 1-inch optic, Bausch and Lomb.

Male.—The same. Length, 0.21 mm.

Antennæ filiform, 10-jointed, very similar to those of the type specimens but the second funicle joint is somewhat shorter; differing from the males *immaturus* Perkins, *excisus* Westwood, *minimus* Walker, *eriococci* Girault and *cacilii* Girault in having the second funicle joint the shortest joint of the antennæ.

Scape and pedicel the same, the latter slightly longer than the united lengths of the first two funicle joints; proximal funicle joint rectangular, longer than wide, a third longer than funicle 2 and a third shorter than funicle 3; the second funicle joint as wide as long, quadrate, a half the length of the following joint, the shortest antennal joint; funicle joint 3 cylindrical, distinctly longer than either of the preceding two joints but a third or fourth shorter than joints 4, 5 and 6 which are equal; joint 7 slightly longer than 4, 5 or 6 and the terminal or club joint conical and subequal to 4, 5 or 6; funicle widening very slightly beyond joint 3. Pubescence arranged as follows: Scattered on the scape; a single row encircling the pedicel and each of the first three funicle joints and two rows on funicle joints 4 to 7, at their proximal and apical thirds respectively; the club joint has at least 3 rows. Distal angles of funicle joints 3 to 7 acute. The proximal row of setæ on funicle joint 4 sometimes absent. Genitalia pallid, exerted in death. Mandibles acute. A conspicuous seta from a piliferous spot arises from the lateral aspect of the intermediate tibia at its proximal third.

From 6 specimens, $\frac{3}{8}$ -inch objective, 1-inch optic, Bausch and Lomb.

Redescribed from 6 males and 3 females captured from the panes of a window August 25 (1 ♂), 27 (1 ♂), 29 (1 ♂) and September 1 (2 ♂'s, 2 ♀'s) and 3 (1 ♂, 1 ♀), 1909 in an old pig-shed on a farm at Centralia, Ill.

In the table of species given in a recent paper on this genus (Girault, 1908a) these specimens run to *iceryæ* Riley and are typical specimens of that species, only they differ from the type specimens of the species in having an additional discal cilium in the fore wings and in being somewhat different in size, smaller, and in general coloration. The characteristic shortening of the second funicle joint in the male readily differentiates this species from all others of which the male is known. There is great difficulty in accurately determining the character of the body sculpture and other obscure body markings in these minute and very delicate mymarids but it is not of extreme difficultness to select differentiating characters in species whose habiti have already indicated their distinctness. In spite of the seeming difficulties reasonable care and discrimination will not fail in recognizing those species already described if the descriptions include such characters as wing ciliation and antennal structure. As far as I know sculpture of the body varies but little with the species of this genus.

Habitat.—Centralia, Ill., and 'see Girault (1908a). I have since captured two female specimens on the glass side of a greenhouse on the campus of the University of Illinois, Urbana, Ill., April 30, 1910.

2. *Alaptus cæcili* Girault.

Girault, 1908a, pp. 189-191, fig. 3.

In the original description of this species (p. 190, paragraph 1, line 2) it is stated that the second funicle joint of the antenna is nearly a third *larger* than the third funicle joint; length was intended rather than general dimension, for the second joint is a third *longer* than the third joint but not as broad.

I have an additional female specimen of this species captured at Centralia, Ill., September 1, 1909, on a window. Its distribution in the United States must be wide.

3. "*Alaptus pallipes* Ashmead."

An examination made of the type of this species through the kindness of the authorities of the U. S. National Museum, formerly inaccessible, shows that the tarsi are 4-jointed and the fore wings densely ciliated; the shape of the wings and antennæ further preclude its position here. It was described as a species of *Alaptus* by Ashmead in 1887 (Ashmead, 1887; Girault, 1908a). I shall not attempt to place it at present other than without this genus and

within the Mymaridæ; it has Anaphine affinities. The type of the species is a single tag-mounted specimen and is necessarily in bad condition for adequate study. It is simply labelled "*Alaptus pallipes* Ashm. Type. Jacksonville, Florida," and has no number in connection with it.

The genus *Alaptus* now contains the following species which are both valid and recognizable: *minimus* Walker; *iccryæ* Riley; *immaturus* Perkins; *globosicornis* Girault; *cacilii* Girault; *eriococci* Girault and the new species—*intonsipennis*—described beyond. The species *immaturus* Perkins needs fuller description. The species *fuscus* Walker, *pallidicornis* Foerster, *fuscus* Foerster and *cxcisus* Westwood, in short all of the European species with the exception of the type of the genus, are certainly unrecognizable at present and perhaps for all time, and I have already indicated this. Finally, they may have to be dropped from our lists.

In my catalogue of this genus (Girault, 1908a) these omissions occurred: In regard to the species *minimus* Walker, I omitted to give Enock's (1897) rearing of what he supposed was a male from the eggs of *Stenopsocus cruciatus* (Linnæus) and also his statement that this same host contained the larvæ of the species *fuscus* Walker. Concerning the latter I should think there would be even more doubt as to its identity than implied in connection with *minimus* and that the statements concerning both species should be taken for no more than their worth. In the list of literature de Dalla Torre was inadvertently omitted and no reference was made to Isaac (1907) under the species *cxcisus* Westwood.

These remarks, together with the following description of a new species from the United States complete all that is now known concerning this genus. The full descriptive notes given on the species *iccryæ* Riley should aid materially in advancing our knowledge of the generic characters and moreover to impress upon us the fact that specific differences in this genus are what are ordinarily held to be minor characters such as ciliation of the wings, wing shape and antennal structures.

4. *Alaptus intonsipennis*, new species.

Normal position.

Female.—Length, 0.50 mm.

Exactly similar in the general shape of the body, wings and antennæ to

minus Walker but black and with the discal ciliation of the fore wing placed somewhat farther caudad from the cephalic wing margin; otherwise I am unable to distinguish the two species structurally or otherwise with the exception of another minor character mentioned later in this description.

Fore wings in all details as in *minus* Walker, the slight proximal fuscation present and besides the usual row of discal cilia on both of the wing margins between the bases of the marginal fringes, two other longitudinal rows of discal cilia near the cephalic wing margin, the first close to the margin and somewhat confusable with the cilia at the margin but the second is shorter and is distinctly separated from the margin being between it and the midlongitudinal line of the wing and extending from slightly cephalo-caudad of the apex proximad to a distance slightly beyond the base of the distal half of the wing; the first line is somewhat longer, extending nearly to the excision or acute dilatation of the wing; in *minus* the second line of cilia may be quite close up to the wing margin, therefore more or less confusable with the other and thus leaving the wing disk quite free of cilia. Posterior wings dilated somewhat distad or subclavate and exactly similar to those of *minus*. The marginal ciliation of both wings exactly similar as in that species as is also the extent and shape of the acute dilatation of the caudal margin of the fore wing near its base. However in *intonsipennis*, high power ($\frac{1}{8}$ -inch objective, Bausch and Lomb) reveals in the fore wing a short line of 3 minute discal cilia just off of the caudal margin and just back from the wing apex; these are not visible by low power and I have been unable to find them in *minus*; they do not of course possess much specific value unless they should prove to be constant.

The antennæ are similar to those of *minus* both in regard to relative size and shape of the joints and in pubescence. I have not been able to compare thoracic and abdominal characters; the ovipositor is slightly exerted in both species.

From 3 specimens, $\frac{2}{3}$ -inch objective, 1-inch optic, Bausch and Lomb.

Male.—Unknown.

Described from two female specimens mounted in balsam and captured together on a window-pane in a waiting-room of a railway station at Hendrix (Bloomington), Ill., July 22, 1910.

Habitat.—United States—Bloomington, Illinois.

Type.—Accession No. 44,115, Illinois State Laboratory of Natural History, Urbana, Ill., two females in xylol-balsam, one slide.

Although this species is so similar to *minus* it is not possible to call it that species until we are assured that it may vary in color from brownish yellow to deep black; such variation is not known to occur in this genus up to this time.

Genus *Gonatocerus* Nees.

It is indicated that the present conception of this genus is wrong and that careful revision of it will show at least one other genus represented by its comparatively numerous species. Care should therefore be used in describing new forms of it and in identification work until a revision is made.

Subfamily MYMARINÆ.

Tribe *Anaphini*.Genus *Anaphoidea* Girault.

Type.—*Anaphoidea sordidata* Girault.

This genus was founded upon a moderately large mymarid reared from the eggs of a common weevil, *Tylosderma foveolatum* (Say) which breeds in enormous numbers in the stems of evening primrose. It is fully described by Girault (1909b). Since its discovery, two other closely allied species belonging to it have been found. One of these is a common parasite of the eggs of another curculionid, having a similar habit of depositing its eggs into soft vegetable tissues, namely, *Conotrachelus nenuphar* Herbst and the parasite was described as *Anaphes conotrachelii* Girault (1905b). The other species is unknown to science and is described beyond; it was captured at large in the same locality as was the type species and nothing is known concerning its host. As all of these species are very similar in coloration and general structure, and separated with difficulty at first, and as the species *conotrachelii* is very inadequately and erroneously described, the following diagnostic table and descriptive notes are added. The genus appears to be parasitic on the eggs of various Curculionidæ and is widely distributed in the United States, the species *conotrachelii* being known to exist from Connecticut south to Georgia and west to Texas.

DIAGNOSTIC TABLE OF THE SPECIES OF *Anaphoidea* GIRAULT.*Females*.

Species black and similar in general coloration; fore and hind wings slightly fumated.

- I. Legs distinctly yellow in color, marked with dusky or clouded, two distinct shades of color present. Fore wings broader, with from 12 to 15 longitudinal rows of discal cilia at their broadest blade portion.

1. Second funicle joint of antennæ long, distinctly longer, but not very much more so, than the third funicle joint and the longest funicle joint, distinctly 4 times the length of the proximal funicle joint; funicle joints long, columnar, increasing very gradually in width distad. Posterior wings with a single central row of discal cilia* which consists of from 7 to 15 cilia along the distal half of the wing. Fumation of wings distinct. Second funicle joint distinctly longer than joint 6 of the funicle and but slightly more slender. Large. *sordidata* Girault.
 2. Second funicle joint of antennæ but moderately long, distinctly shorter, but not very much more so, than the third funicle joint or equal to it but slenderer, the third joint very slightly the longest and widest funicle joint but distinctly wider than funicle joint 2; second funicle joint but 3 times the length of the proximal funicle joint. Second funicle joint subequal in length to funicle joint 6, but much more slender. Moderate in size. Funicle joints shorter, cylindrical ovate, increasing noticeably in width at the third joint, thence gradually distad. Posterior wings with no central line of discal cilia, sometimes with 1 or 2 cilia at apex, at the most with a line of 4 cilia at the apex. Fumation of wings lightest. *conotracheli* Girault.
- II. Legs nearly uniformly neutral or dusky or ashy greyish in color, the shading of colors not distinct. Wings narrower, with but from 6 to 9 longitudinal rows of discal cilia at their widest blade portion.
1. Second funicle joint of antennæ but moderately long, distinctly shorter, but not very much more so, than the third funicle joint or equal to it but slenderer, the third funicle joint very slightly the longest and widest funicle joint; second funicle joint but 3 times the length of the proximal funicle joint. Funicle joints shorter, cylindrical ovate, noticeably increasing in width at the third joint, then gradually distad. Posterior wings with a very short central line of discal cilia at the apex, consisting of from 2 to 4 cilia, widely separated. Fumation of wings distinct. Second funicle joint subequal in length to funicle joint 6, but much more slender and somewhat shorter, moderate in size. *pullicrura* new species.

The male *sordidata* may be separated from the male of *conotracheli* by means of antennal characters, the funicle joints of *sordidata* being relatively longer, about 3 times longer than wide, cylindrical to

* The posterior wings in this genus have a row of discal cilia along the cephalic wing margin and a similar paired or double row along the caudal wing margin, all of them arising from between the bases of the marginal cilia or nearly. The row referred to in the table is in the central longitudinal line of the wing blade, at or distad of the apical half.

columnar, whereas in *conotracheli* they are but about two times longer than wide and more near cylindrical ovate than cylindrical. The posterior wing ciliation also differs in the males of the two species as brought out in the table for the females.

1. *Anaphoidea sordidata* Girault.

Girault, 1909b, pp. 169-171.

Since describing this species I have reared it from the eggs of *Tyloderma forcolatum* (Say) in the stems of *Oenothera* as originally the hosts obtained at Butler, Ill., July 16, 1910. The following specimens: 2 ♂'s, July 17; 5 ♂'s, 2 ♀'s, July 26, 1910. Also it has been captured at Urbana, Ill., two male specimens, May 16 and 25, 1910, in sweepings and in a greenhouse.

2. *Anaphoidea conotracheli* (Girault).

Anaphes conotracheli Girault, 1905b, p. 220.

Johnson and Girault, 1906, pp. 5-6.

Quaintance, 1906, p. 327.

Brooks, 1910, p. 110.

Anaphoidea conotracheli Girault, 1909, p. 171.

This species was too briefly and somewhat erroneously described from a very large number bred from the eggs of the plum curculio, *Conotrachelus nenuphar* Herbst. It is very similar to the other species of this genus, *sordidata* and *pullicrura* yet is distinctly different and can be separated from them by a close study of the table given before. It is the same in general coloration as the former species nearly and indistinguishable from it until a close comparison is made of wing and antennal structures; it is more easily distinguished from *pullicrura* as the legs are differently colored, the fore wings are distinctly broader and the antennæ and posterior wings are somewhat different, the first two characteristics however being especially noticeable; its antennæ are very similar to those of *pullicrura*. In its original description, which is inadequate for its proper recognition and which is somewhat erroneous, the following leading corrections are made: The mandibles are tridentate *not* bidentate; the antennæ in the female are 10-jointed *not* 9-jointed, the club being divided, a character heretofore not well recognized in the Mymaridæ; the wings are slightly fumated. The following descriptive details are added: In the female the antennæ differ mostly from those of the female of the type species in the relative length of the second funicle joint

which is slightly shorter than the third funicle joint and more slender than it, the third funicle joint being slightly the longest funicle joint; also in this species all of the funicle joints are shorter and stouter than those in *sordidata* and the funicle is distinctly broader after the second joint; funicle joints 3 to 6 subequal in length and width, the third joint slightly the longest and all four slightly longer and distinctly wider than the second funicle joint; excepting the first, all

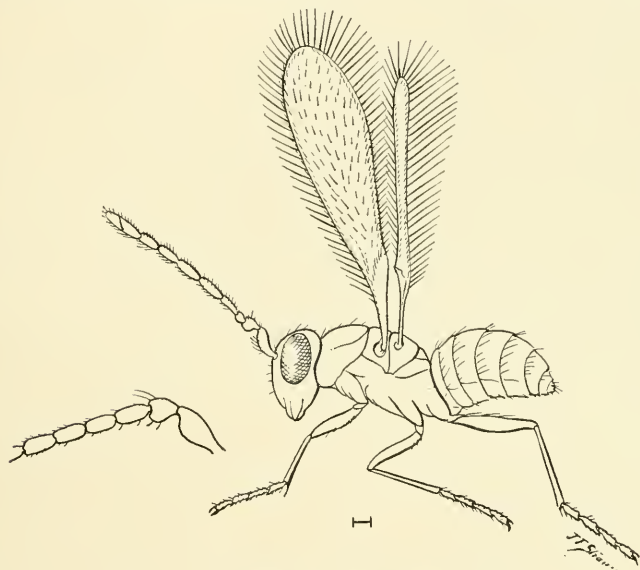


FIG. 1. *Anaphoidea conotracheli* Girault.*

funicle joints at least thrice longer than wide, the second funicle joint slender; the fore wings in the female are similar to those in the type species excepting minor differences impossible to describe; the posterior wings differ from those of the type species as brought out in the table of species but in both *conotracheli* and *sordidata* there are a few minute discal cilia just caudad of the marginal vein. The

* Enlarged outline drawing showing the general habitus of the species and genus. The structural details are not correct and the figure should not be used to replace descriptive matter or for purpose of specific identification. Thoracic, fedaal and wing details are the ones lacking in accuracy but the general habitus is excellent and the antennæ are correct in regard to the relative size and shape of the joints.

parapsidal furrows are complete, widely separated. Both the discal and the marginal ciliation of the fore wing is shorter in this species than in *sordidata*, especially noticeable along the cephalic wing margin; in *pullicrura* they are still somewhat longer than in the last-named species. Another point of difference between *pullicrura* itself and *conotracheli* and the type species taken together is that in the former the longest marginal cilia of the fore wing are about equal in length to the greatest wing width but in the latter two species distinctly shorter than the wing is wide.

The males differ from the males of the type species in antennal structures, having shorter flagellar joints as brought out in the table. Otherwise there are no very noticeable differences.

Redescribed from the following specimens: (1) Cotypical specimens, 4 ♂'s, 2 ♀'s on a single slide in balsam labelled "From eggs of *Conotrachelus nenuphar* Herbst, Fort Valley, Ga., May 10, 1905. A. L. Quaintance." And reared at Washington, D. C., from hosts transported through the mails. (2) Metatypical specimens, 4 ♂'s, 10 ♀'s on a single balsam slide labelled "Quaintance No. 883. *Anaphes conotracheli* Girault. From the eggs of *Conotrachelus nenuphar*. From hosts in plums received from W. E. Britton, Berlin, Conn., July 10, 1905." Reared at Washington, D. C. And (3) metatypical specimens, 5 ♂'s, 11 ♀'s, labelled "Quaintance No. 902. From eggs of *C. nenuphar*. From hosts in plums received from W. E. Britton, Berlin, Conn., July 12, 1905." Also reared at Washington. These specimens, excepting the first series, were kindly loaned to me by Prof. A. L. Quaintance, Bureau of Entomology, U. S. Department of Agriculture, Washington, D. C., through the courtesy of Dr. L. O. Howard, Chief of Bureau, and all of them were reared during 1905 from the eggs of the host mentioned transported to Washington from various points in the United States. With the exception of the types and cotypes, all of these specimens are in the collections of the Bureau of Entomology, Division of Deciduous Fruit Insect Investigations.*

* I have since examined all of the material in the family Mymaridæ in the collections of the U. S. National Museum and find included therein 4 male and 2 female metatypical specimens of this species, tag-mounted and each labelled "Quaintance No. 270. On *Conotrachelus nenuphar*, Arundel, Maryland, V, 19, 1905. A. A. Girault, Collector." The collections of the National Museum therefore contain the 4 type specimens and these metatypes.

Types.—Type No. 8433, United States National Museum, Washington, D. C. Two ♂'s, 2 ♀'s, tagmounted. (Arundel, Maryland, May 20, 1910). *Cotypes*.—Accession No. 44,104, Illinois State Laboratory of Natural History, Urbana, Ill., the slide of 4 ♂'s, 2 ♀'s mentioned in foregoing (Fort, Valley, Georgia). Since writing the above, I have also reexamined the types in the National Museum collection.

Through the kindness of Professor Quaintance I am able to give herewith the following list of localities from which this parasite has been received and reared at Washington by the agents of the National Bureau of Entomology in connection with its only known host, during the investigations of deciduous fruit insects. The parasite was first discovered from Fort Valley, Ga., early in the spring of 1905 and the list is interesting from the fact that during that same year it shows that the species was found nearly simultaneously from points widely scattered over the United States.

List of localities from which *Anaphoides conotracheli* (Girault) has been obtained, as reared from the eggs of the plum curculio (*Conotrachelus nenuphar* Herbst):

Fort Valley, Ga.,

May 10, 11, 31, June 15, 14, 28, 29, 1905.

Arundel, Md.,

May 16, 18, 19, 30, June 6, 10, 2, 14, 13, 1905.

Riverdale, Md.,

May 16, 30, July 15, 19, 24, 1905.

Ardmore, I. T.,

May 16, 1905.

Washington, D. C.,

June 9, 14, 1905.

Alexander, Va.,

June 15, 1905.

Victoria, Texas,

June 15, 1905.

Arlington, Va.,

June 15, 20, July 8, 13, 17, 1905.

Lexington, Va.,

June 18, 1905.

Afton, Va., June 27, 1905.

Berlin, Conn.,

June 13, July 6, 7, 8, 16, 11, 12, 13, 14, 18, 1905.

College Park, Md.,

July 22, 24, 25, 29, 1905.

Falls Church, Va., August 12, 1905.

Myrtle, Ga., April 12, 1906.

3. *Anaphoidea pullicrura*, new species.

Normal position.

Female.—Length, 0.65 mm. Moderately small. Normal.

General color dark to black with some brownish, shining: Flagellum of antennæ concolorous with body, more brownish, clothed with short grayish pubescence, the pedicel and scape lighter, dusky yellowish, slightly darker than the general color of the legs; the lateral neutral dusky, grayish yellowish, uniform in color, distinctly lighter than and contrasting with, the general body coloration, the distal tarsal joints as usual, darker. Eyes dark red. Coxæ more nearly concolorous with the body; trochanters pallid. Fore wings lightly but distinctly fumated, the fumation somewhat deeper proximad and absent in a small more or less rectangular area caudad of the submarginal vein; very much as in the species *sordidata* Girault; posterior wings similarly fumated over their entire surface. Venation of both wings concolorous with the wing surface. Ventum concolorous. Body sculpture consisting of very fine lines, absent on the abdomen; surface of the eyes much coarser than the body sculpture.

Fore wings moderately, closely, uniformly ciliate in the disk as in *sordidata* Girault, the discal cilia moderately long and close but not more than a third as coarse and much shorter than the marginal cilia; discal cilia absent directly distad of the marginal vein for over the latter's length and absent also proximad and caudad of the venation as described for *sordidata*; the single isolated cilium also present. Marginal cilia as in the type species but proximad shortest at the *cephalic* margin. Fore wings narrow, narrower than those of the type species, their greatest width at the distal fifth not being equal to the length of the longest marginal cilia (at the apex of the caudal margin) and bearing at that point but from six to nine rows of discal cilia. Venation and other characters of the wings as in the type species.

Caudal wings also as in the type species of the genus but more slender and somewhat less curved, its marginal cilia relatively the same but shorter and slightly more delicate, differing mostly in the discal ciliation which is approximately the same but the single longitudinal row in the center of the blade is confined to the apical part of the blade and consists of not more than four or five or less than two cilia or setæ extending proximad from the apex a short distance and widely separated in the line from each other; this row appears normally to contain about three cilia; sometimes it is absent.

Legs normal, similar to those of *sordidata* but the proximal tarsal joints

somewhat the longest. Ovipositor not conspicuous. Head, thoracic and abdominal characters similar to those of the type species as far as could be ascertained.

Antennæ somewhat similar to those of the type species in having the conspicuously small first funicle joint, but in this species the third, not the second, funicle joint is the longest antennal joint (excepting the scape) and the funicle joints distad of the first are all somewhat shorter and broader and the funicle itself is distinctly broader distad of its second joint, not the case in the type species, there the broadening of the funicle distad of its second joint being barely noticeable; second funicle joint shortest (excluding club joints and funicle 1), subequal in length to the sixth, whereas in the type species it is distinctly longer. Scape as in *sordidata*, somewhat more slender, longer than the club and longer in proportion to the first and second funicle joints; pedicel the same, subequal in length to funicle joints 2 and 6, about as broad at its apex as most of the funicle joints; first funicle joint same as in the type, about the third the length of the second funicle joint but equal to it in width, not the case in the type species; second funicle joint subequal to but slightly shorter than the pedicel and funicle joint 6; the third funicle joint longest, excepting the scape, distinctly broader than the preceding joint and about a third longer, a fourth longer than the fourth, fifth and sixth funicle joints taken separately, which are subequal but shorten very gradually distad; the club divided at about its middle, obliquely, the proximal joint slightly the shorter, obconic, obliquely truncate at its apex and subequal in length to joint 6 of the funicle, the apical joint conical, slightly longer; club ovate, widest at its middle, not more than a third wider than any of the funicle joints distad of the second and about equal to slightly over a third of the length of the funicle or slightly longer than the combined lengths of joints 5 and 6 of the funicle; its apex obtusely pointed. Apical angles of joints 3-6 of the funicle acute, the club with distinct longitudinal ridges. Pubescence of antennæ somewhat similar to the discal ciliation of the fore wings, moderately close, soft and uniform and similar to that of the type species. The antennæ are like those of *conotracheli*.

From 4 specimens, $\frac{3}{8}$ -inch objective, 1-inch optic, Bausch and Lomb.

Male.—The same as the female with the exception of the secondary sexual characters.

Abdomen in shape usual to the genus. Antennæ filiform, 12-jointed; scape subclavate, about one and a half times longer than the obconical pedicel; flagellar joints gradually shortening distad, the first two subequal in length, each about as long as the scape; third, fourth, fifth and sixth flagellar joints subequal, a fourth shorter; seventh joint slightly shorter; the eighth and ninth joints subequal, slightly shorter; the tenth or club joint slightly shorter than the preceding joint, somewhat conical, twice or more longer than wide, distinctly longer than the pedicel and about two-thirds the length of the proximal funicle joint. Flagellar joints with scattered, irregular, moderate, grayish pubescence and with several longitudinal carinae. The

antennæ differ from those of the male of *conotracheli* in having more noticeable pubescence, the hairs of the antennæ being minute and inconspicuous in that species, in having the antennal joints somewhat more slender, intermediate in length between *conotracheli* and *sordidata* but more like the former. The male of the last-named species has about the same amount of pubescence on the antennæ as has the male of *pulicrura*.

Habitat.—United States—Centralia and Urbana, Ill.

Type.—Accession No. 41,686, Illinois State Laboratory of Natural History, Urbana, Ill., 1 ♀ in xylol-balsam.

Described from three female specimens mounted in balsam and subsequently cleared in xylol and allowed to dry in order to obtain correct description of the sculpture and other body characters and a fourth specimen of the same sex stupefied with chloroform and studied unmounted before its death. Three of these specimens were captured on August 26 and 30, 1909, on the panes of a small window and the fourth in the same place on September 5, 1909, at Centralia, Ill. Subsequently, I have captured a single female at Urbana, Illinois, June 9, 1910, in a greenhouse and two males in the same locality, July 1, 1910, sweeping and in a greenhouse.

This species is about two-thirds the size of *A. sordidata* but recently described from the same locality but at first glance or casually very similar to it; it is still more like *conotracheli* in antennal structures. However, the narrower wings, the much shorter row of discal cilia of the posterior wings, the lesser number of longitudinal rows of discal cilia in the fore wings, the short second, the longer third funicle joints, the broadening of the antennal funicle distad of the second joint, the darker first funicle joint and lighter more uniformly colored legs are characters which must be depended upon to distinguish it from the type species and which are readily detected upon close study. Its narrower fore wings separate it from *conotracheli*.

Tribe *Mymarini*.

Genus *Polynema* Haliday.

1. *Polynema bifasciatipenne* (Girault).

"*Polynema acanthi* Ashmead," Pierce, 1907, p. 361.

Stichothrix bifasciatipennis Girault, 1908b, pp. 115-117.

Since describing this species I have had access to all of the *Mymaridæ* in the collections of the United States National Museum and find therein four tagmounted sets of it, a study of which con-

vinces me that it belongs to *Polynema* Haliday and not to *Strichothrix* Foerster. The species is a very striking one and should be easily recognized. The specimens referred to were labelled "*Cosmocomma* n. sp." and the sets bore labels as follows: (a) "No. 860 e.—from eggs of *Æ. niveus* in Raspberry (June 3, 1881, 2 ♂'s, 1 ♀); in resin-weed (June 3, 1881, 1 ♂, 1 ♀). From resin-weed (June 7, 1881, 1 ♂, 4 ♀'s; June 10, 1881, 2 ♀'s); proctotrupid from eggs of *Æcanthus niveus*, Fredonia, Kansas, May 31, 1881 (2 ♂'s, 1 ♀)." (b) "331⁰¹.—11-18-88—"; 1 ♀. (c) "College Station, Texas, September. Banks." 1 ♀. (d) "Onaga, Kansas; Crevecoeur." 2 ♀'s.

On account of the fact that the original description of this species was made from but two balsam-mounted female specimens, many of its characters were not given, not being visible. I consider it important therefore with the present opportunity to add the following supplementary descriptive details more for the purpose of adding to a knowledge of the generic characters rather than to those of the species. Also the male is described for the first time.

Normal position.

Female.—Length, 2 mm., more or less; variable.

The general color is rather yellowish-brown, not dark, the antennal club, the five distal funicle joints and the tibiae dark, the club and funicle joints 5 and 6 the darkest of these; body shining; color of body uniform; eyes with a few short, minute, scattered hairs; genæ with some darker spots.

(Dorsal aspect) face between the eyes concave, margined; vertex rectangular, margined, the "vertexal carina" represented by a narrow margined groove across the cephalic margin of the vertex, fuscous mesially, and along the sides of the vertex near the eyes, also fuscous; on the vertex caudad it is present, crossing the occipital margin and proceeding into the occipital foraminal depression, ventro-mesad and there concolorous. The caudal or occipital margin of the vertex is merely margined, not grooved. The ocelli in the center of the occipital margin of the vertex, the lateral ocelli separated from the cephalic ocellus by the margined occipital margin of the vertex and in the dorso-caudal aspect, that is slightly within the occipital region, the cephalic ocellus in the dorsal aspect; ocelli distant from the round eyes, the lateral ocelli slightly farther from each other than each is distant from, the eye margin and slightly farther from the respective eye margins than each is from the cephalic ocellus; antennæ inserted above the middle of the face, widely separated, near the eye margins and about a third the distance up the eye margins.

Pronotum with a narrow median carina, seen in certain lights only; genal sulcus absent. Parapsidal furrows nearly straight, oblique; the meso-scutum with a distinct median carina cephalad, its cephalic margin convexly

rounded, the prothorax conical, long, its lateral dorsal margins carinated, the region nearly as long as the mesoscutum, but remote from the tegulae, its caudal margin much concaved. Scutellum subquadrate, slightly longer than wide, flat, its sides margined, with *no longitudinal grooved lines*, but transversely near its apex is the usual transverse line of minute punctures, in this species weak and somewhat irregular. Mesopostscutellum transverse, not a sixth the length of the scutellum, its cephalic margin apparently a line of very minute punctures or striations; metathoracic disk, or that portion between the lateral carinae small, triangular, elevated, with no median carina, the *lateral carinae* of the metathorax *distinct*, converging, meeting in a point at the apex of the metathorax; laterad of the true lateral carinae, caudad, not quite in a line longitudinally with the spiracle, is a complete carina or fold, less conspicuous cephalad but proceeding nearly to the spiracle and curving slightly; and still farther laterad, in the center of the dorso-lateral aspect of the metathorax is an oblique (caudo-mesad or cephalo-laterad) carina or fold; metathoracic spiracle minute, circular, not touching the postscutellar folds.

Petiole of abdomen dorsad at base, convex or slightly obtusely barbed, smooth. Abdomen not compressed, (dorsal, lateral aspects) conic-ovate, the petiole not quite half the length of the body of the abdomen, subequal in length to the antennal club and the caudal coxae, but somewhat longer than either. (Dorsal aspect) segments 2 and 3 of the abdomen subequal, occupying somewhat over half of the surface, each slightly shorter than the petiole; segments 4 to 8 all subequal in length, each not quite half of the length of either segments 2 or 3; caudal margins of the abdominal segments straight; exerted sheaths of the ovipositor not quite half the length of the abdomen (excluding petiole). Body smooth, somewhat shining but the head and the notum of thorax (excepting the metathorax) exhibit a fine polygonal reticulation, somewhat scaly in appearance; abdomen with no perceptible sculpture. In addition to the carinae on the metathorax there are also two inconspicuous oblique grooves along the dorso-lateral aspect of that segment laterad of the second carina (the one at the spiracle).

Trochanters 2-jointed; tibial spurs single, the cephalic ones forked and curved, the cephalic proximal tarsal joint ventrad with the corresponding strigils. Petiole of abdomen smooth, not sculptured. Along the ventro-lateral aspect of the prothorax is a margined groove extending from the insertion of the cephalic coxa, cephalad to the head; it is broadly convexed and is just ventrad of the deep, conspicuous femoral furrow of the propleurum.

Submarginal vein narrow, straight, the marginal much broader, twice longer than broad but not distinctly long as in *Stichothrix*; in all of the specimens in the National Museum collection the third fuscous band of the fore wing, crossing slightly distad of the widest part of the wing, is rectangular, not narrowing at all caudad, the distal and proximal margins nearly parallel but the distal margin is often broken and irregular; both the second and third fuscous bands or areas may be fainter or absent at the immediate

cephalic or caudal margins of the wings. There are at least two cilia arising from the apex of the marginal vein and one from the apex of the submarginal. Posterior wings with no discal ciliation centrally but a line or two of minute cilia follow the margins on each side.

Funicle of the antennæ thicker after (distad) the third joint, the club the longest joint; joint 6 of the funicle is distinctly longer than the pedicel and funicle joint 4 longer than joint 5 and subequal to joint 1 of the funicle, the joints 4, 5 and 6 of the funicle each shortening. Club and joints 4, 5 and 6 of the funicle more hairy, subhispid, the white setæ close, short and dense on the club.

Mandibles 3-dentate, symmetrical, the dentations subequal but somewhat variable, the middle tooth slightly the largest, all subobtusely conical.

From 16 specimens, $\frac{2}{3}$ -inch objective, 1-inch optic, Bausch and Lomb.

Male.—Length, somewhat shorter in general than the female.

Same in general habitus as the female but with longer, filiform, slender antennæ and shorter, less pointed abdomen. Characteristics the same.

Antennæ 13-jointed, pubescent with short white hairs, most noticeable distad of the first funicle joint, the scape, pedicel and first funicle joint honey yellow, the remaining joints brownish black, becoming gradually darker distad. Scape short, dilated or convex ventrad, compressed, much longer and wider than the pedicel but not as long by about a third as the proximal funicle joint; pedicel smallest, obconic, about a third of the length of the proximal funicle joint and slightly thicker; remaining joints filiform and all subequal, excepting the conic-ovate club joint and the proximal funicle joint; funicle joints 2 to 5 about equal, longest, joint 1 a fourth shorter; joints 6 to 10 of the funicle about equal, slightly shorter than joints 2 to 5, slightly longer than joint 1; club joint slightly shorter, subequal to joint 1 of the funicle. Funicle with the usual longitudinal carinæ.

Abdomen (lateral aspect) fusiform, obtusely convex dorsad, ridged slightly along the meson ventrad; (dorsal aspect) ovate, the second and third segments united covering three-fourths of the surface, each subequal to the other, the fourth segment a fourth the length of the third, the fifth shorter, the sixth apparently minute, barely visible, the seventh and eighth apparently equal or subequal, each slightly shorter than segment 5, the eighth short, conic, with a loose tuft of hairs. Petiole (segment 1) smooth, at least three-fourths the length of the main body of the abdomen or nearly equal in length to the united lengths of segments 2 and 3.

From 7 specimens, $\frac{2}{3}$ inch objective, 1-inch optic, Bausch and Lomb.

In addition to the specimens already named in this connection, I have received for determination from Mr. W. D. Pierce of the National Bureau of Entomology a set of one male and three females all mounted on tags and each bearing the following label: "Clarendon, Texas, 9/19/1905. On *Grindelia squarrosa*. 10/10/05. V. 14 e. Hunter No. 1080. W. D. Pierce collector." Also in the National

Museum collection two tagmounted females labelled respectively: "*Cosmocomma acanthi* Ashm. Delaware. Amer. Ent. Soc. To be returned" and "Bred from eggs of *Æcanthus* by H. S. Smith. Ex. eggs of *Æcanthus*. Melrose Highlands, Mass."

This species was originally described from specimens reared in the District of Columbia and is now recorded from Kansas, Delaware, Texas and Massachusetts, and thus must be widely distributed in the United States; I have never seen it in Illinois though other members of the genus are common there on windows and in sweepings. More recently I have a specimen from N. Y.

The species was first mentioned in the literature by Pierce (1907) under the name of *Polynema acanthi* Ashmead, a *nomen nudum*. It was reared by him from the eggs of an *Æcanthus* in the stems of *Grindelia* while studying weevils and their parasites. The specimens just mentioned as having been received from him are undoubtedly the ones referred to in the place cited.

Genus *Stichothrix* Foerster.

1. *Stichothrix bifasciatipennis* Girault.

As has just been shown this species is a *Polynema*.

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THE PERIODICAL CICADA ON LONG ISLAND, N. Y., IN 1910.

BY WILLIAM T. DAVIS, .

NEW BRIGHTON, STATEN ISLAND, N. Y.

On the third of July, 1910, I walked in the Half Way Hollow Hills near Wyandanch, Long Island in quest of the seventeen-year cicadas that were reported by Mr. Frederick M. Schott earlier in the season. I found that their presence was well known to the residents of the district and many of the pupa skins were lying on the ground about the edge of a cultivated tract. The cicadas had come up among the young trees of about ten years' growth, which surrounded the field on two sides. Across the road I found the pupa skins very common in a cleared wood-lot, and a great many of them were clinging to the piles of cord wood. There were also many holes in the ground both here and in the locality last mentioned, from which the cicadas had emerged, and I found where they had laid their eggs in white birch, white oak, scarlet oak and *Populus grandidentata*. Though only parts of dead cicadas remained at the time of my visit, yet they had been very numerous, and I was informed that a woman had supposed she heard the whir of a mowing machine in a nearby field, not knowing of the presence of the seventeen-year locusts this year.

The species occurred in great numbers in the same territory in 1906, and Mr. Holmes showed me the dead branches on his apple trees that had died by reason of having so many cicada eggs laid in them during that visitation.

In the latest United States Dept. of Agriculture Bulletin on the Periodical Cicada, Mr. Marlatt says that "an instance of a few weeks acceleration under out door conditions is given by Mr. Schwarz. Commenting on the slightly early emergence of individuals of Brood XIV near Harper's Ferry, W. Va., in 1889, in a small clearing surrounded by woods, Mr. Schwartz urges that a clearing made in the midst of a dense forest forms a natural hot house, the soil securing in such places much more warmth than in the shady woods. That the cicadas should appear a little earlier in such situations is not remarkable, and he suggests also that under favorable circumstances the cicadas might develop on such cleared places one or more years in advance of the normal time, and that these precursors, if numerous enough, would be able to form a new brood."

In the Long Island locality they were certainly numerous enough to lay a great many eggs, and may possibly establish a new brood. Brood No. 1 (1910) is not recorded from the states of New Jersey or New York, but occurs more to the south and southwest, whereas Brood No. 2 (1911) is well known in New Jersey, Staten Island and part of Long Island.

It may be that the cicadas that appeared this year on a limited area in the Half Way Hollow Hills, would not have come from the ground until June, 1911, if the timber had not been recently removed.

ENTYLIA GERMAR AND ITS DIFFERENT FORMS.

BY IGNAZ MATAUSCH,

ROSELLE, N. J.

(With Plate VII.)

Through the kindness of Prof. W. M. Wheeler I have come into possession of a great number of specimens of *Entylia sinuata*—705 altogether, including 119 nymphs and 12 nymphal exuviae—with the data of capture. This material has enabled me to study the insect in nearly all of its phases and color variations.

The following are the data given me by Professor Wheeler: "The *Entylia sinuata*, which I send you, were all taken September 3 to 6, 1910, at Colebrook, Litchfield County, Conn., on the lower sur-

faces of the leaves of *Eupatorium purpurcum* L. None was found on the coarse variety of this plant known as *maculatum* L., which is very common in the same localities. The adult Membracids were resting in two rows, the individuals alternating on each side of the mid-rib of the leaf, usually with their heads directed towards the apex of the leaf. The young specimens were often more irregularly arranged. Each leaf seemed to be infested with a single colony, all the members of which, though variable, usually presented a strong family resemblance and differed more or less from the colonies on other leaves. Nevertheless, there were sometimes considerable

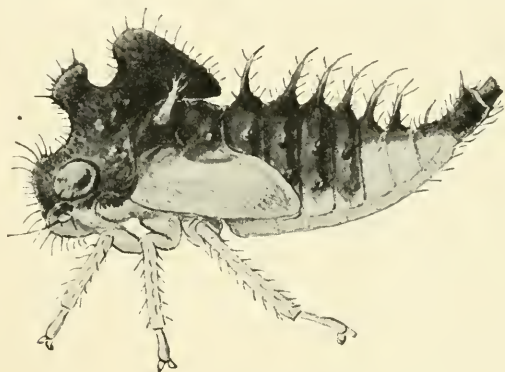


FIG. 1. *Entylia sinuata* Fab., nymph.

variations in form and color in the same family. The insects seem to have started out on the lower leaves of the plant, which were often quite brown and withered, and then to have moved to higher leaves for a fresh supply of sap. Some of the plants had been seriously injured. In some localities both the young and adult *Entylia* were being attended by the following ants: *Tapinoma scissile* Say, *Lasius niger* L. var. *americanus* Emery, *Formica fusca* L. var. *subsericea* Say and *Myrmica brevinodis* Emery var. *canadensis* Wheeler."

Comparing the specimens with Van Duzee's Fig. 1-6, Pl. I, in his studies on North American Membracidae, and the figures of *Entylia sinuata* var. *mira* Butl. in the *Biologia Centr. Amer.*, Vol. II, Figs. 12-12a, I find that the specimens from Colebrook, Conn., represent all of these forms and also the beautiful color variety

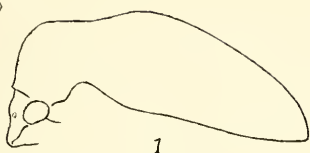
Publilia concava Say var. *nigridorsum* Godg., but *P. reticulata* Van D. is not among them although it is also, in all probability, merely a variety of *Entylia*.

As shown in the Figs. 1-12 on plate VII the variations represent a graded series from *Publilia* Stål to *Entylia concisa* Walk. with the most gradual transitional forms. These forms represent more or less completely the various "specific" forms. Besides the forms represented in the figures I found a single male in which the anterior thoracic prominence is completely lacking, but as this insect seems to be malformed I have not drawn it and have represented only the forms which occur most abundantly in the series. Owing to the large number of specimens it is impossible to describe all the different variations, especially as all conceivable shades of the ground coloration and pattern occur. Occasionally, however, a single specimen is unique in the series by reason of its striking individual pattern. On the other hand, there are groups of specimens each presenting a single type but varying, especially in the ground color, within rather narrow limits. Thus, *e. g.*, there are *Entylia-Publilia*-forms which have a gray or brown color mottled more or less with yellow, white, dark brown or black. Among the *E. sinuata*-forms there are, with sporadic exceptions, variations of the various yellow, brown, reddish brown and black ground colors, with yellow, light and dark brown, black and white markings.

That the insect also occurs on other plants besides *Eupatorium purpureum* is shown by the following data: Prof. Wheeler collected on July 7, 1908, at South Harpswell, Me., 20 females and one male of the *Entylia-Publilia*-form, together with numerous eggs on *Solidago*. Mr. William Reiff took numerous specimens of the same form together with many nymphs on September 7, 1909, at Forest Hills, Mass., on the same plant. Prof. Otto Lugger, in the "Sixth Annual Report of the Entomologist of the State Experiment Station of the University of Minnesota" (1900) says that *Entylia sinuata* occurs "on a variety of plants and it is somewhat partial to sun-flowers."

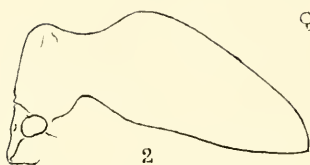
The nymphs of the series collected by Prof. Wheeler, in comparison with those taken last year by Mr. Reiff, have a somewhat more prominent thorax; in other respects they are identical. Color variations were found only in the fully grown nymphs; and these variations, of course, foreshadow those of the adult insect. The text-figure 1 represents a full-grown nymph.

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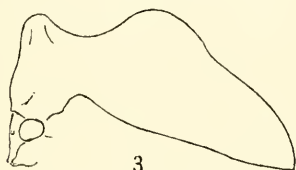
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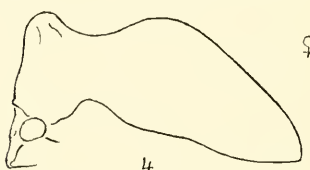
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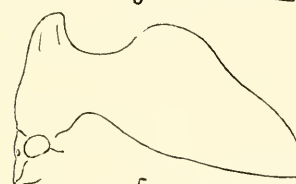
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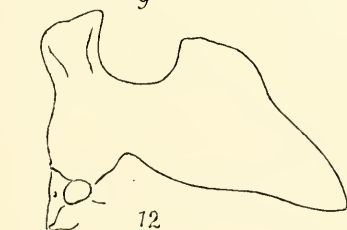
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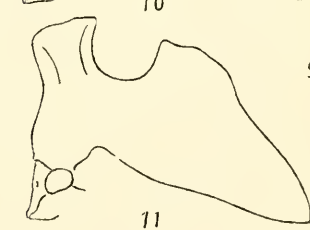
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11

Entylia sinuata Fab.

In the series of Connecticut specimens the females predominated somewhat over the males; 7 per cent. of them were of the different *Publilia*-forms including the transition form shown in Fig. 4, which, moreover, seems to be very close to *P. porrecta* Fowl.

I have in my collection in addition to the *Entylia-Publilia*-forms a fine pair from Prof. J. B. Smith. This was taken in Jamesburg, N. J., and stands between *E. concisa* Walker and *E. sinuata* var. *mira* Butl. From Mr. William Beutenmueller I have received a female which is somewhat more like the *concisa*-form. It was collected in June in the Black Mts., N. C. Mr. William T. Davis has given me four females of the *concisa* form collected in Alexandria Co., Va., June 14, 1907. A male taken by Mr. Ch. Olsen in Staten Island, N. Y., Aug. 16, 1908, belongs to *E. bactriana* Germ. and another male of the same form was taken by Mr. H. Mueller in the Bronx, N. Y., and I have myself taken a male of the same size and more like the female *bactriana* in Queens, Long Island. I have received from the firm Staudinger & Bang-Haas several specimens taken in Rio Grande do Sul, Brazil, together with a specimen from Peru. The females in this series vary among themselves, but they differ from the northern forms in the shape of the anterior thoracic prominence which is strongly directed anteriorly and in the much lower posterior thoracic prominence. The single male, which I have represented in Fig. No. 3, is undoubtedly a southern variety.

Reference to the literature shows that the Membracid I have been considering is distributed over the whole American continent from Canada, through the United States and Central America to South America.

The great variation in the series from Connecticut is very interesting because all the specimens were taken at the same time, on the same species of plant and in a very restricted area. It would seem therefore that the variation could hardly be attributed to the effects of external conditions. Owing to its remarkable variability *E. sinuata*, which has been known since 1771, has been described under no less than 21 different names.

THE USE OF INSECTS AND OTHER INVERTEBRATES AS FOOD BY THE NORTH AMERICAN INDIANS.

BY ALANSON SKINNER,
NEW BRIGHTON, STATEN ISLAND, N. Y.

It is perhaps not very generally known that insects and other invertebrates were used for economic purposes by the aborigines of North America. So far as our records show, the Indians east of the Mississippi never made any use of insects as food. Several reasons may be assigned for this, but the most important of these is the universal practice of agriculture south of the Great Lakes. In other regions where the economic conditions were regulated by the abundance of the game supply, periods of famine occurred, when recourse to insect food was not uncommon. The presence of permanent vegetable staples through agriculture, of course obviated this necessity, so that the absence of such customs occasioned an entirely different psychological attitude towards insect food in the East.

Concerning the Menomini, a well-known Central Algonkin tribe, for instance, we read:* "The Menomini Indians are not addicted to eating all kinds of reptiles, insects and other loathsome food, as was common to many of the tribes of the great basin and of California. This form of diet may result from having always lived in a country where game, fish, and small fruits were found in greater or lesser abundance, and the evident relish with which we find the so-called Diggers, the Walapai, and others, devour grasshoppers, dried lizards, beef entrails, and bread made of grass seed mixed with crushed larvæ of flies, would appear as disgusting to the Menomini as the Caucasian."

West of the Mississippi we find insects used as food by tribes of the Algonkian, Siouan, Shoshonean, Athabaskan, Pujunan, Pinan, and Shastan stocks, at least. The Assiniboine, the most northerly located of the Siouan tribes, are said to have used pulverized insects dried in

* Hoffman, The Menomini, 14th Annual Report, Bureau of American Ethnology, p. 287.

the sun for food in cases of necessity.* De Smet also says: "I have seen the Cheyennes, Snakes, Utes, etc., eat vermin off each other by the fistfull. Often great chiefs, while they talked to me, would pull off their shirts in my presence without ceremony, and while they chatted would amuse themselves with carrying on this branch of the chase in the seams. As fast as they dislodged the game, they crunched it with as much relish as more civilized mouths crack almonds and hazel-nuts or the claws of crabs and crawfishes."†

De Smet‡ states of these people: "Add to this, by way of an exquisite dessert, an immense dish of crusts, composed of pulverized ants, grasshoppers and locusts, that had been dried in the sun, and you may then be able to form some idea of Assiniboine luxury."

In the desolate forests and barren grounds, the natives, mostly of Athabaskan stock, make use of insect food in a different manner. Russell§ says of the Dog Ribs: "A gadfly (thought to be *Hypoderma lineata* by Dr. Riley, but in the absence of specimens the species is uncertain) deposits its eggs in the back of the caribou, in some individuals to the number of several hundred, which renders the skin utterly useless for leather. The grubs were well developed in the latter part of April when I left the barren ground. The Indians did not remove them from pieces of meat destined for the kettle." Hearne|| remarks of the same people: "The Indians, however, never could persuade me to eat the warbles, of which some of them are remarkably fond, especially the children. They are always eaten raw and alive out of the skin and are said by those who like them to be as fine as gooseberries."

The Shoshone proper, and other tribes of the same stock dwelling on the plains were not averse to entomological numbers on their bill of fare. "Among other things the former are said to have relished serpents, lizards, grasshoppers, mice, crickets and pismires which

* Lowie, The Assiniboine, Anthropological Papers of the American Museum of Natural History, Vol. IV, Part I, p. 12.

† De Smet, Life, Letters and Travels, etc., Vol. III, p. 1002.

‡ Father De Smet's Life and Travels among the North American Indians (Chittenden and Richardson), p. 1032.

§ Frank Russell, Explorations in the Far North, being the report of an expedition under the auspices of the University of Iowa, during the years, 1892, 1893 and 1894, p. 228.

|| Hearne, Journal, p. 316.

were thrown into a large tray filled with burning cinders, in which they were tossed about until roasted. Roasted ants were preserved in bags for future consumption.”*

De Smet† avers that “The Soshoco (probably a Shoshonean tribe) who subsists chiefly on grasshoppers and ants, is miserable, lean, weak and badly clothed.”

“The principal portion of the Soshoco territory is covered with wormwood, and other species of artemesia, in which the grasshoppers swarm by myriads; these parts are consequently most frequented by this tribe. When they are sufficiently numerous, they hunt together. They begin by digging a hole, ten or twelve feet in diameter, by four or five deep; then, armed with long branches of artemesia, they surround a field of four or five acres more or less, according to the number of persons who are engaged in it. They stand about twenty feet apart and their whole work is to beat the ground, so as to frighten up the grasshoppers and make them bound forward. They chase them toward the center by degrees—that is, into the hole prepared for their reception. Their number is so considerable that frequently three or four acres furnish grasshoppers sufficient to fill the reservoir or hole. The Soshocos stay in that place as long as this sort of provision lasts. Some eat the grasshoppers in soup, or boiled; others crush them, and make a kind of paste from them which they dry in the sun or before the fire: others eat them *en appalas*—that is, they make pointed rods and string the largest ones on them; afterwards these rods are fixed in the ground before the fire, and, as they become roasted, the poor Soshocos regale themselves until the whole are devoured.”

The Maidu, a Pujunan tribe of California, according to Dixon‡ were also insectivorous to some extent. “Grasshoppers and locusts were eaten eagerly when they were to be had. The usual method of gathering them was to dig a large, shallow pit, in some meadow or flat, and then, by setting fire to the grass on all sides, to drive the insects into the pit. Their wings being burned off by the flames,

* Lowie, The Northern Shoshone, Anthropological Papers of the American Museum of Natural History, Vol. II, Part III, p. 183.

† Father De Smet's Life and Travels among the North American Indians (Chittenden and Richardson), p. 1032.

‡ Bulletin American Museum of Natural History, Volume XVII, Part III, p. 120.

they were helpless, and were thus collected by the bushel. They were then dried as they were. Thus prepared, they were kept for winter food, and were eaten either dry and uncooked, or slightly roasted."

Of the Shasta, a California tribe of Shastan stock, Dixon* also remarks: "Angle worms, grasshoppers, and locusts, do not seem to have been eaten to any extent."

In regard to the Pima† (Piman) of southern Arizona we note under the head of "Ma'kûm": "These unidentified worms (?) are plentiful when a rainy season insures a heavy crop of desert plants. They are gathered in large quantities, their heads pulled off, and intestines removed. The women declare that their hands swell and become sore if they come in contact with the skin of the worms. The worms are then put into cooking pots lined with branches of salt-bush and boiled. The skins are braided together while yet soft and dried a day or two in the sun. The dry and brittle sticks are eaten at any time without further preparation."

It would appear from the foregoing accounts that the use of insects as food by the North American aborigines was restricted to that portion west of the Mississippi and was in vogue particularly among the Indians towards the Pacific slope. It is possible that the eastern Cree, Naskapi and Montagnais, who like the northern Athabascans belong to the sub-arctic culture, also eat the *Cuterebra* grubs which are found in the caribou, but no notes seem to have been obtained by the writer or others on the subject. The eastern Cree and Ojibway often kill lice, caught on their persons, by cracking them with their teeth, but I have never observed that they ate them afterwards, although I have been assured that this was the case.

* *Ibid.*, Vol. VIII, p. 245.

† Frank Russell, The Pima Indians, 26th Annual Report of the Bureau of American Ethnology, p. 81.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF TUESDAY, JANUARY 18, 1910.

Held at the American Museum of Natural History. President C. W. Leng in the chair with twenty-one members and five visitors present.

The minutes of the preceding meeting were read and approved.

The Librarian, Mr. Schaeffer, reported the receipt of the following exchanges:

Deutsche Entomol. Zeitschrift, 1909, No. 6.

Zeitschrift f. wissenschaftliche Insekten Biologie, V, No. 12.

Coleopterorum Catalogus, Pt. 4.

Tijdschrift voor Entomologie, LII, Nos. 3, 4.

The Curator, Dr. Lutz, exhibited a large map recently purchased by the museum, from which a local map, 8 × 10 inches, had been drawn and placed in the hands of the printer for reproduction.

Dr. Lutz also announced that Mr. Johnson had promised to name the Diptera belonging to the local collection.

He reported that the insect collection of the museum, with the exception of the Lepidoptera, had been moved into a room in the new wing, where those interested might consult the collection.

Dr. J. L. Zabriskie, of the Executive Committee, read the following report: "Regarding the report of the Ottawa Field Naturalists' Club, Ottawa, Canada, that this society contribute towards defraying the expense of a permanent memorial, in the form of a drinking fountain, consisting of a granite shaft with bronze medallion, inscription, etc., to be erected at the Experimental Farm, Ottawa, to commemorate the good work in furthering natural history performed by the late Dr. James Fletcher, which request was referred to your executive committee with power, the said committee reports as follows:

"At a meeting of the executive committee of the New York Entomological Society, held January 4, 1910, directly after the regular meeting of the society, it was unanimously resolved:

"This committee hereby instructs our treasurer to forward to the Ottawa Field Naturalists' Club twenty-five dollars from the funds of this society—as a contribution towards defraying the expense of the proposed memorial, and express to the Ottawa Field Naturalists Club the high esteem of the New York Entomological Society for the character and work of the late Dr. Fletcher.

J. L. ZABRISKIE,
G. W. J. ANGELL,
G. P. ENGLEHARDT,
C. L. POLLARD,
C. E. SLEIGHT."

Dr. Lutz read the following letter addressed to Mr. Jacob Doll: "The members of the New York Entomological Society have learned with deep regret of your sad bereavement and desire to express sincere sympathy with you, their fellow-member.

"On behalf of the New York Entomological Society.

FRANK E. LUTZ,
GEORGE P. ENGELHARDT,
EDMUND B. SOUTHWICK."

The president appointed as members of the auditing committee: C. F. Groth, E. L. Dickerson and F. E. Watson. As field committee, R. P. Dow and C. E. Olsen.

Mr. Leng spoke on "Some Results of Four Days' Collecting in the White Mountains," exhibiting some of the beetles found, and photographs of the mountains, loaned by Mr. John Sherman. He referred to the various lists which had been published, beginning with E. P. Austin in 1874, Mrs. Annie Trumbull Slosson, 1893, 1894 and 1895, Fred C. Bowditch in 1896 and seven additional lists by Mrs. Slosson up to 1906 and added the following species taken by him in September, 1909, at elevation of 4,000 to 5,000 ft.—*Hypolamps mellyi*, *Stenotrachelus arctatus*, *Otiorynchus ovatus*, *Piazorhinus scutellaris*, *Cyphomimus dorsalis* and *Erycus morio*.

He stated that of these only two could be regarded as boreal insects and that in the lists already published only a small part of the insects listed were boreal.

He closed by describing the open camp, called the Perch, at which he slept for three nights and the woods and mountains in its vicinity.

There followed a discussion of the stranding of certain insects on mountain tops.

Mr. Schaeffer exhibited a collection of beetles of the genus *Pogonocherus*, with all of the species represented, and spoke of the characters and distribution of the different species.

Mr. Barber spoke concerning "Some Hemiptera New to the Fauna of the United States." These were exhibited and commented upon. His remarks concerning these will be published in the body of the Journal.

Mr. Melville T. Cook in responding to a request to address the society, spoke chiefly concerning some of his work in Cuba, mentioning some of the more common insects they had to deal with, the peculiarities of the people and the characteristics of the climate and country.

Mr. Wolley Dod spoke concerning some of his collecting experiences in the Rocky Mts. of Alberta, B. C., mentioning especially some of the interesting Lepidoptera to be taken there.

Mr. John W. Angell exhibited a small collection of insects obtained from Bermuda.

Society adjourned.

MEETING OF TUESDAY, FEBRUARY 1, 1910.

Held at the American Museum of Natural History at 8.15 p. m., President C. W. Leng in the chair, with seventeen members and two visitors present.

In the absence of the secretary the president asked Mr. Dickerson to act in that capacity.

Dr. Lutz, the curator, called attention to the screen which had recently been installed for use with the lantern and exhibited the January number of the Museum Journal containing a photograph of the society's meeting room. Copies were presented for distribution among the members. He stated that a number of the maps for illustrating the local distribution of insects had been printed and on three of these indicated methods which might be used. On one the distribution of *Cicindela dorsalis* and *generosa* was shown, on another the topographical conditions and on the third the areas included by 50-mile circle. Further methods were also suggested. He stated that Dr. Petrunkewitch had corrected his copy of Emerton's "Common Spiders," bringing the nomenclature up to date.

A specimen of *Pieris oleracea* acquired by the society and taken in the vicinity of Paterson was also shown by Dr. Lutz.

Dr. Zabriskie, chairman of the executive committee, stated that the donation of \$25 to the Fletcher Memorial Fund had been forwarded by the treasurer, and read a letter from Mr. Arthur Gibson, secretary of the Memorial Fund Committee, acknowledging the receipt of this donation and thanking the society for it. Moved by Dr. Zabriskie, duly seconded, that this letter be placed on file.

Under scientific discussion and papers—Mr. Schaeffer called the society's attention to an article in a recent number of *Tijdschrift voor Entomologie* on the habits of *Methoca*, a group of parasitic Hymenoptera which oviposit on the larvæ of *Cicindela*.

Mr. Dickerson gave some notes on *Rhynchitis bicolor* which had been reported in injurious numbers at Worcester, Mass., last year, and at other times in other localities. The insect occurs widely distributed in the United States, but in his experience in New Jersey was somewhat local and commoner at some points than at others. For several years he had noted it on *Rosa rugosa* at New Brunswick, N. J., and had observed it there feeding and ovipositing on the seed capsules, the latter operation lasting somewhat over fifteen minutes, and the beak being used in making the puncture and pushing the egg into place. Beetles began to appear in May and were first observed feeding on the unopened buds. Specimens of the feeding and egg punctures, petals injured by the beetles, and the insect in the egg, larval and adult stages were exhibited.

Dr. Lutz spoke on "Notes on Evolution as Illustrated by Experiments with Insects" and said that recently there had been much discussion as to the effects of selection, and some students of evolution felt that while the soma might be affected by it the germ cells were not. Jennings had stated that nothing new was formed by selection and Pearl, of the Maine Experiment

Station, in working with poultry had obtained negative results in selecting eggs to obtain modifications in the chickens.

Dr. Lutz, himself, had been continuing his work with the fruit fly, *Drosophila ampelophila*, and by selection for decrease and increase in the number of veins had obtained results evidently not produced before in nature. He had worked with some 200,000 flies, one lot of which came from Huntington, L. I., and another from Boston and Pennsylvania. By careful selection he had obtained 100 per cent. abnormality in extra-veined specimens which he was able to continue for several generations. In like manner he was able to obtain flies with the tips of the wing veins lacking, but these possessed wings so weak that they drooped on the banana upon which the flies were fed and so were killed off and the strain could not be continued. He had been able to breed from a normal to an abnormal strain in eight generations and concluded that artificial selection had had a decided effect upon the insects. In considering the question of the abnormal strain reverting, he liberated in a battery jar, in one experiment, the most abnormal specimens of the abnormal strain and in twelve generations, covering a period of twenty-four weeks, they went back to the normal form. In a second experiment, he released in a battery jar an equal number of normal and abnormal forms and in three or four generations the flies reverted to the normal form. He believed the active force at work in these experiments was sexual selection.

Dr. Lutz then reviewed some of the facts discussed by Tower in his paper on "Evolution in the Chrysomelid Beetles in the Genus *Leptinotarsa*." Tower has pointed out that *Leptinotarsa decemlineata* has been derived from *intermedia* which has its habitat in central Mexico. The latter form spread northward along the routes of travel, where the form *decemlineata* became prominent and it in turn spread first northward along the buffalo trails and later through the introduction of the potato, eastward to the Atlantic seaboard. The form *juncta* retreated before the form *decemlineata*. In moisture and temperature experiments he found that the deviation from the normal produced first melanism and, as the deviation increased, albinism. By varying conditions of humidity and temperature and exposing females to these changed conditions for a period just preceding oviposition, forms were obtained which held their variation through several generations, even when allowed to breed under natural conditions. By abnormal environment, also, a strain having five annual generations has been obtained while three is the greatest number that naturally occurs in this group.

Mr. Leng spoke of the color variations that occurred in some of the Coccinellidæ, and asked whether Dr. Tower had obtained any structural differences. Dr. Lutz said he believed that he had.

Mr. Davis called the members' attention to Bull. No. 33 of the Louisiana Crop Pest Commission, by W. Newell, dealing with the treatment of the boll weevil by the use of powdered arsenate of lead, and also the comment upon it by Mr. Hunter in *Science*. Mr. Davis suggested that the success of this method would do away with the necessity of destroying the scenic effects necessitated by destroying the hibernating places of the insects.

Mr. Dickerson stated that powdered arsenate of lead was a comparatively new form of the substance, it having been used hitherto as a liquid spray.

Meeting adjourned.

E. L. DICKERSON,
Secretary pro tem.

MEETING OF TUESDAY, FEBRUARY 15, 1910.

Held at the American Museum of Natural History, President C. W. Leng in the chair, with twenty-one members and two visitors present.

The minutes of January 18 and February 1 were read and approved.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges:

Coleopterorum Catalogus, Pars 6, 7.

Canadian Entomol., XLII, Nos. 1, 2.

Entomologisk Tidskrift, Vol. XXX, Nos. 1-4.

Societas Entomologica, XXIV, Nos. 19, 20.

Wiener Entomologische Zeitung, XXIX, No. 1.

Bull. 225 N. J. Agr. Exp. Station, Dec., 1909.

Mittheilungen aus d. Naturhist. Museum in Hamburg, XXVI, Dec., 1909.

Deutsche Entomolog. Zeitschrift, No. 1, 1910.

The curator, Dr. Lutz, exhibited and spoke concerning a series of maps, showing the distribution of the tiger beetles within the 50-mile limit, to illustrate the effectiveness of the plan to record the occurrence of our local species. These maps were prepared from records obtained in the collections of Messrs. Harris, Leng, Davis and the Staten Island Association of Natural Sciences, besides the local collection.

Mr. Davis, on behalf of the committee, exhibited a book containing the historical letters of the society. Upon motion the committee was discharged.

Mr. Schaeffer read a letter from the Russian Entomological Society, announcing the celebration of its fiftieth anniversary on March 11, and inviting the society to send a delegate to represent it.

On motion the secretary was requested to reply to the letter.

The librarian having requested more book cases, the matter was referred to the treasurer and librarian.

Mr. John Angell proposed as an active member of the society Mr. T. R. Richardson, 459 W. 123d St., New York. On motion the secretary was authorized to cast a single ballot for the election of Mr. Richardson.

Dr. Osburn suggested the securing of all the photographs of eminent entomologists and especially those of all members of the society. Dr. Love moved that Dr. Osborn be named as a committee of one to get together such a collection of photographs, to include also the photographs of ex-members and corresponding members. Carried.

Dr. R. C. Osburn exhibited a large number of diptera of the families Syrphidae and Conopidae belonging to the local collection, many of which Dr. Osburn has donated to make the collection more complete.

He spoke of the habits and structural characters of the more interesting species. One of these, *Tabanus zonalis*, is new to the New Jersey list of insects, having been taken by Mr. F. E. Watson at Greenwood Lake, N. J., June 30, 1909.

Mr. Alanson Skinner spoke concerning "The Use of Insects and other Invertebrates as Food by the North American Indians."

He mentioned the western tribes among whom insects are used as a food, especially locusts, maggots, crickets, ants (pismires) are most frequently employed and these might be prepared in various ways though commonly they were ground after being dried and then made into paste or dough and cooked, mixed with some other ingredients.

Mr. Sleight exhibited two cases showing the life history of several species of our local caddis flies.

Mr. William T. Davis stated that he had collected the grasshopper *Hesperotettix brevipennis* at Yaphank, Long Island, on July 27, 1909. Twelve specimens were secured in a small clump of sweet fern almost circular in form and 36 feet in diameter. The females had just matured, and there were a few nymphs. All seen were not collected, as it was thought best to preserve the little colony. No others could be found on July 27, even in neighboring clumps of sweet fern, but at a subsequent date three were found in sweet fern in the same field. Specimens have been found at Lakehurst, N. J., in August and September, and it has been reported by collectors from several localities in southern New Jersey. Prof. Morse has found it sparingly at Wellesley, Mass., but it appears to be a rather rare grasshopper and has been usually found in but small colonies.

Mr. Engelhardt exhibited two ticks, *Ornithodoros* sp., which he had received from Mexico some two months ago, alive, and considerably larger than in the present shriveled condition. They had lived for nearly the entire time without food.

Dr. Lutz exhibited an automatic folding trap lantern, and asked for suggestions for its improvement.

Society adjourned.

INDEX TO NAMES OF INSECTS AND PLANTS IN VOLUME XVIII.

Generic names begin with a capital, specific names with a small letter.
New genera, subgenera, species, subspecies and varieties are printed in *italics*.

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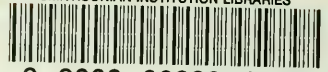
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